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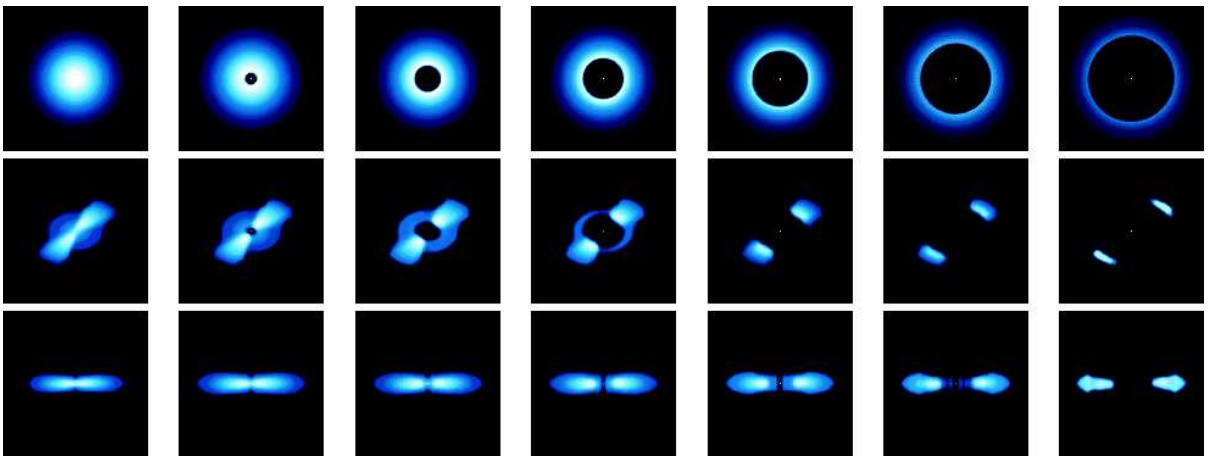

Be STAR NEWSLETTER

NUMBER 38 - March 2007

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Cover illustration: Intensity maps conmputed with the SIMECA code showing the formation of a ring ranging from 0 to 60 stellar radii by 10 R_* steps. Seen pole-on (upper row), at 45° (center), and equator-on (lower row) (Meilland, Stee, Zorec, & Kassan 2006, A&A, 455, 953, used by permission of the authors).

The Be Star Newsletter is produced at and financially supported by the Georgia State University Department of Physics and Astronomy. The electronic version is hosted by the University of Virginia Department of Astronomy and is available on the World Wide Web at `http://www.astro.virginia.edu/~dam3ma/benews/` .

1. EDITORIAL

In June 2005 we were deeply saddened by the sudden death of our colleague John Porter. We dedicate this issue of the *Be Star Newsletter* to John and publish a series of tributes to his life that were written by professional colleagues, close friends, and family.

Issue No. 38 of the *Be Star Newsletter* contains contributions and abstracts received since 2005 March. Featured are several reports on recent spectroscopic variability in Be stars including activity in γ Cas, HD 6226, Pleione, and θ CrB. μ Cen also made the news in 2006 January by reaching its brightest magnitude in more than two decades, while Pleione faded toward the end of 2006.

We are introducing a new section in the *Newsletter* that we call **Community Comments**. We will publish near verbatim exchanges of ideas among members of the active B star community. This open forum will allow researchers to voice their opinions on scientific issues and terminology that will become part of the published literature in the spirit of unedited discussion contained in the conference proceedings. We would like to encourage you to take advantage of this new avenue of communication.

We continue to post articles, short communications, and abstracts on our website (`http://www.astro.virginia.edu/~dam3ma/benews/`) as they are accepted. Abstracts normally appear within 24–48 hour of receipt. Please send contributions by electronic mail to **benews@mucen.usc.edu** with a copy to **dam3ma@virginia.edu** either as a LaTex or postscript/pdf file. We **require** that abstracts be submitted as a LaTex file using the template provided on our website. We prefer that illustrations be sent by E-mail as postscript or pdf files, but we can handle most contemporary picture formats.

The next Issue of the *Newsletter* will contain the proceedings from the meeting of the Working Group on Active B Stars that took place at the IAU General Assembly in Prague, Czech Republic on 2006 August 18. Included will be the report from the business session and articles from nine scientific presentations. The editors wish to thank all who contributed to this issue and look forward to receiving your contributions for Issue No. 39.

We appreciate the continuing support from the Department of Physics & Astronomy at Georgia State University for the production of the paper edition of the *Be Star Newsletter*.

Gerrie Peters, Editor-in-Chief

2. WORKING GROUP MATTERS

2.1. John M. Porter

We are deeply saddened and shocked to learn of the sudden death of our colleague Dr. John Porter on Tuesday, June 7, 2005. Details are still quite sketchy, but we refer you to an announcement posted by his institution at `http://www.astro.livjm.ac.uk/`.

John was a frequent contributor to the Be Star Newsletter and wrote an excellent invited review article entitled "The Structure and Continuum Emission of Viscous Discs" (*Be star Newsletter, Issue No. 36, p. 6, 2003*). He is well-known for an important contemporary review article on Classical Be Stars, recently written with Thomas Rivinius (*PASP, 115, 1153, 2003*), that has already been frequently cited. John was elected to the Scientific Organizing Committee for the Working Group on Active B Stars in August 2000 for a 6-year term that ends with the conclusion of the IAU GA in Prague. It has been a pleasure to correspond with John and we will truly miss the e-mails from "John Porter!".

We would like to compile a list of condolences and statements that convey just how well-respected and liked John was in the active star community to present to his family. Please send us your input at the familiar `benews@mucen.usc.edu` within the next week and we will forward it to a colleague of John's at Liverpool John Moores University and also post it on our website.

Gerrie Peters
David McDavid
Doug Gies

2.2. Remembering John Porter

- "John was a great asset to the hot star community, doing innovative and important theoretical work on circumstellar disks around hot stars. His review article on Be stars, written together with Thomas Rivinius, will stand as one of the landmark recent references in the field. He was also truly one of the "good guys", and his presence will be sorely missed by many of us who had been lucky enough to interact with him over the years."

  Karen Bjorkman
  U. Toledo

- "John Porter was my buddy. He was the kind of friendly, outgoing fellow who makes it enjoyable to be involved with other people in astronomical research: asking questions, thinking of new ideas while remembering old ones, and somehow making the time to actually accomplish something. He had a wonderful sense of humor and never took himself too seriously. He must have had more important business elsewhere, but I'm glad he left us with such a happy sense of expansion."

  David McDavid
  U. Virginia

- "John and I co-presented a focus session at a recent meeting in Johnson City, and there I got to know him as a very affable friend as well as a valuable collaborator. He was always smiling, and had a keen sense of how to simplify difficult topics. I will miss having the opportunity to interact with him at meetings; our whole community is lessened without him."

  Kenneth Gayley
  Univ. of Iowa

- "John will be remembered as one of the younger hot star specialists who, through his enthusiasm, outspoken talents and sense of humor, gave all of us this unique feeling of shared enjoyment. His sharp contributions are well documented. His modest, humble and cheerful personality made him unforgettable. People who interacted with John Porter!, are privileged."

  Huib Henrichs
  U. Amsterdam

- "I've learned to know John during the Alicante Meeting in 1999. I always appreciated his sense of humour, that did not exclude himself or our work. Although we've met in person only at too few conferences, I was in frequent e-mail contact with him, in particular during the time we worked together on the review. Working on this text, I've learned a lot about theory, and I can only hope that my contributions about observational astronomy come close in clarity to the parts he wrote. He was an excellent astronomer, and next to the completed works and contributions he has left us many new ideas to try out and to learn something new about the universe."

  Thomas Rivinius
  European Southern Observatory

- "I'm out of science business for some years now, but still follow what's going on. When I received the message of John's death I was really shocked and sad - I still am. I met John at the IAU Colloquium at Alicante in 1999. I was deeply impressed by his humor and good and friendly nature. At times, when I'm nostalgic and remember

some episodes in my life as an astronomer, John and our happy time in Alicante are always a part of it."

Sascha Tubbesing

- "I had the great privilege of knowing John for the entire span of my career as an astronomer, beginning as an undergraduate tutee of his, and continuing through to our recent collaboration on an ApJ letter. He walked tall in our community, as an outstanding scientist, a heart-warming entertainer, and a consummate gentleman. I will treasure my memory of him as all of these things, but also as the most genuine of friends, who, with his northern English sensibilities, always told me when I was talking absolute crap."

  Rich Townsend
  Bartol Research Institute

- "Meetings were different when John Porter participated in them. He added life and and his very own but very shareable cheerfulness to the discussions. Even what could have been perceived as a critical or skeptical remark he expressed with a warm and honest smile on his face. There was hardly a contribution to the discussions, be they in the lecture hall or over coffee, in which he did not refer to an amazing wealth of unpublished results and inspiring conjectures, over and above the impressive printed records of his work. Probably, everyone is convinced that professional competence can really unfold only in the presence of matching interpersonal competence. Only few people reach this goal but John was the prototypical example. Meetings will be different without John Porter."

  Dietrich Baade
  European Southern Observatory

- "I had regrettably no chance to meet John Porter personally but I closely followed his studies since the time he entered the field and hoped in a personal interaction. I would like to express my sincere condolences to his family and friends."

  Petr Harmanec
  Academy of Sciences of the Czech Republic

- "The sad news this week suddenly put the little disappointments, worries, and frustrations of everyday life in perspective. They seem so trivial now. To John's family, friends, and colleagues in the UK; I give you my deepest sympathy. I hope you know that John's clever wit and cheery disposition touched many lives.

  "I first met John about 7 years ago, and during the past few years we have been working more and more together. Usually not a week had gone by without some correspondence. It seems like yesterday when he visited Canada and he spent a wonderful evening with my family. It was a hot summers night and we relaxed outside on the front porch at my home. John observed the brightly coloured birds arriving at my bird feeders and he insisted that the birds of Canada must surely be dipped in bright paint and those native to Britain must surely be bleached!

  "John was an excellent researcher whose work was always completed in a thoughtful thorough manner. He never once let me down with any request for information, an explanation, or a computation.

  "On Tuesday, June 7, 2005, when I arrived at work there was an email in my in-box from John. As I went off to teach my class that morning, I never imagined that I

would never have the opportunity to respond. There are so many things I would like to have said to John. I will miss him."

Carol Jones
University of Western Ontario

- "John Porter was widely recognised as one of the most original and creative thinkers in our field. In addition, and above this, he was an excellent colleague and friend. He had the rare gift of being able to discuss the most serious matters with a touch of humour. His loss is a hard blow to our community. Sadly, many wonderful things that John might have helped to discover will now remain hidden for a long time."

  Ignacio Negueruela
  University of Alicante

- "John was my lecturer for *Introduction to Stellar Astrophysics* when I was an undergrad at JMU/Liverpool University. He really fired my enthusiasm for what went on in stars and brought the whole subject to life for me. Although I am no longer directly involved in Astrophysics, I can still have intelligent conversations with my Astrophysics colleagues in my department and it's mainly thanks to what John taught me! He will be sadly missed."

  Lesley Watters (grad student)
  Dept. of Physics and Astronomy
  McMaster University, Hamilton, Ontario

- "Besides his research and teaching activities, John has been also member of the Organizing Committee of the IAU Working Group on Active B Stars since 2000. We exchanged many e-mails particularly between 2000 and 2003, when I chaired the Committee. It was always pleasure to get John's messages and views - informal and constructive. John did always his best to help, but - like at the conferences - in a very modest way and without emphasizing his personality. Often he even commented his own contribution with his natural humor.

  "When we were completing the SOC for the Sapporo meeting, John was among the first candidates but he stepped back before the elections, saying that some colleagues already in the SOC can cover his field. We were all looking forward to his invited review talk in Sapporo this September. His talk will remain one of our unrealized dreams forever. We will miss him in Sapporo as well as in our everyday work in the future. John was not only an excellent scientist and teacher, but also the kind and modest man. One of those, who make the present world of the hard competition softer and more friendly. I will keep my deepest respect to his memory."

  Stanislav Štefl
  European Southern Observatory, Chile

- "I never had the privilege of directly collaborating with John on a project, but interacted with him many times through e-mail, especially concerning his contributions to the *Be Star Newsletter*. I will miss his insightful comments that were usually presented in a cordial air. As others who commented above, I feel that progress in the subdiscipline of activity in B stars will be slowed until another person like John Porter emerges in the community."

  Gerrie Peters
  University of Southern California

- "As current chair of the IAU Working Group on Active B Stars, I feel I should try to express somehow the collective sense of personal and scientific loss our community feels at John Porter's sudden and tragic passing.

  "In the very nice web collection put together by the editors of our newsletter, many have already added their personal reflections, citing also the many ways John contributed to our community, from the gentle humor shared at conferences, to the sense of perspective given to deliberations of our Organizing Committee. Several noted his many insightful papers and reviews, especially the outstanding invited summary he and Rivi wrote to promote a positive profile for our field. Others have expressed also how much we will miss his expected future contributions, most immediately the invited talk he will never give at the upcoming meeting in Sapporo, but extending further to the numerous seeds and sprouts of ideas he planted around so many of us, which we now will have to nurture without benefit of his good common sense on when to fertilize, and when to prune.

  "In reading these various reflections I am struck by how the individual experiences echo common themes centered on John's many admirable qualities. To me perhaps most remarkable was the balance he brought to both his personal and professional life, with an ability to synthesize into a coherent whole what might seem like opposing traits. He had, as noted, a keen sense of humor; yet he took quite seriously his duties as a scientist and teacher, to seek out the nature's truths, and share freely his insights with students and colleagues alike. He had an almost boundless curiosity; yet he managed to bring focus and coherence to his research program. He was inventive and creative, open to new ideas in himself and others; yet he retained a healthy skepticism that allowed him to detect and filter out weak arguments and flimsy evidence. He was humble and unassuming; yet he had the air of easy self-confidence of someone comfortable in his own skin.

  "Quite apart from the common stereotypes, success in science (as in life) is built upon such synthesis. And so even beyond his many individual contributions to our community, it seems we all owe John even more for his example, on how to be better scientists, and on just how to be."

  Stan Owocki
  Bartol Research Institute

- "When John died 2 weeks ago my family were all so shocked that we didn't know what to do. Slowly, we started finding out things about John we had not previously been aware of.

  "His physics was far removed from anything that we could understand and I, for one, didn't appreciate what he was up to and chose to talk about other things at family gatherings. It's been a real eye opener to read the tributes posed on your web site (all the family have been to read them). I sat one night going through the tributes strumming the acoustic guitar that John got when he started learning at school when the guitar was almost as big as he was. We printed them off and displayed them at his wake along with some of our favourite photographs. It still seems that the funeral was for someone else.

  "So, thank everyone from the family for their kind remarks - it did help. We will always miss him - I have run out of words...."

  Regards,
  Dave Porter

3. WHAT'S HAPPENING?

3.1. Possible He I 6678 Emission Activity in γ Cas

Ernst Pollmann[1] and Berthold Stober[2]
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email: ernstpollmann@aol.com
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Received: 1 December 2004; Accepted: 16 May 2005

1. Introduction
Spectroscopically γ Cas has been investigated mostly in the Balmer lines, mainly in Hα. Recent studies considered He and Fe lines as well as the kinematics of the circumstellar shell (Hanuschik 1994; Smith 1995). It is believed that a local density enhancement – a one-armed density spiral – is embedded in the circumstellar disk of γ Cas. The precession of this density enhancement has been observed interferometrically by Berio et al. (1999). They found that this enhanced equatorial density pattern may be located at 1.5 stellar radii from the star's surface. Stee et al. (2003) proposed that He excitation and ionization, particularly He I 6678, extend to 2.3 stellar radii. The probably time-dependent mass loss from the primary component of the γ Cas binary system allows us to assume that both photospheric and disk density variations lead to the observed double peak profile variations. Recent investigations of Smith (1995), Harmanec et al.(2000), and Miroshnichenko et al.(2002) give detailed information about long-term monitoring of the phase and time dependent radial velocities and equivalent widths of the He I 5875 emission and the He I 6678 line.

2. Results
First spectra from Pollmann with a resolution R $\sim$ 8500 come from May 2002 obtained with the grating spectrograph of the 200 mm Schmidt-Cassegrain telescope of the Vereinigung der Sternfreunde Köln. The spectra of Stober were taken with a 300 mm Newton telescope and a Littrow grating spectrograph (R $\sim$ 8000). Usually, about 100 CCD spectra, with integration times of 20–30 s were combined. Each single spectrum has been carefully examined for cosmic rays. In case of any cosmic ray appearence the respective spectrum has been rejected not to introduce artificial flaws within the nightly sum spectrum. The complete data reduction and equivalent widths measurement have been done according to a standard procedure as already described by Pollmann (1997). The accuracy of a EW measurement was determined in each sum spectrum according to the method of Chalabaev & Maillard (1983). The size of the error bars of individual data points correspond to the maximum standard deviation of 14%. Our S/N ratio was always between 400 and 1600. To evaluate the time behavior of emission activity and to reduce error bars, we combined individual values of the equivalent widths of the violet component EW(v) and the red component EW(r) to the sum EW(v + r) = EW(v) + EW(r) as presented in Fig. 1.

In Fig. 2 single spectra are combined as an "average normal spectrum" for the period May 2002–March 2004 (JD 2452452–2453081).

On May 19, 2004 (JD 2453145) we observed He I 6678 only as weak absorption of EW(v + r) = 25 mÅ but followed by a strong and short outburst until about August 02 (JD 2453220) with a maximum of EW(v + r) = −255 mÅ. To illustrate these two "events" the appropriate spectra are printed together with the "average normal spectrum" in Fig. 2. For clarification we show in Fig. 3 the extreme spectra at JD 2453145 and JD 2453220 between 6500–6700 Å.

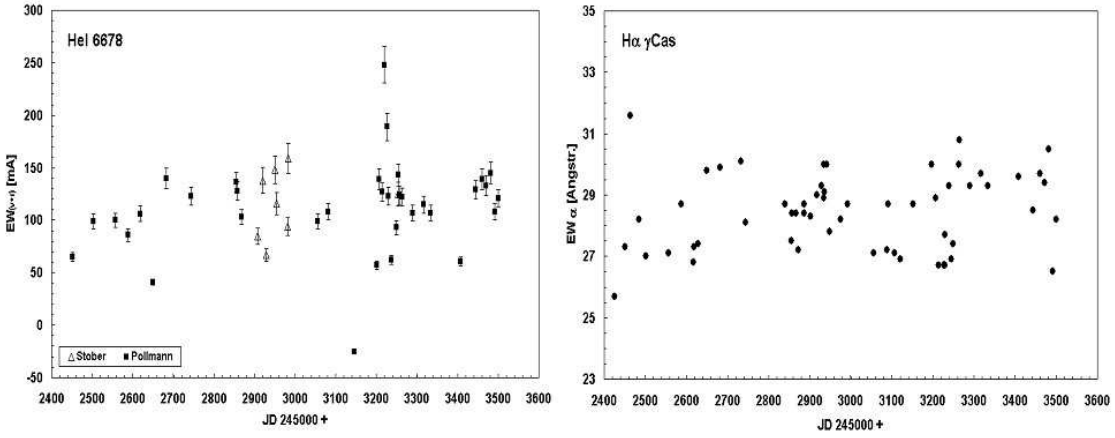

Figure 1. Comparison of the time behavior of the He I 6678 and Hα emissions in the same time interval.

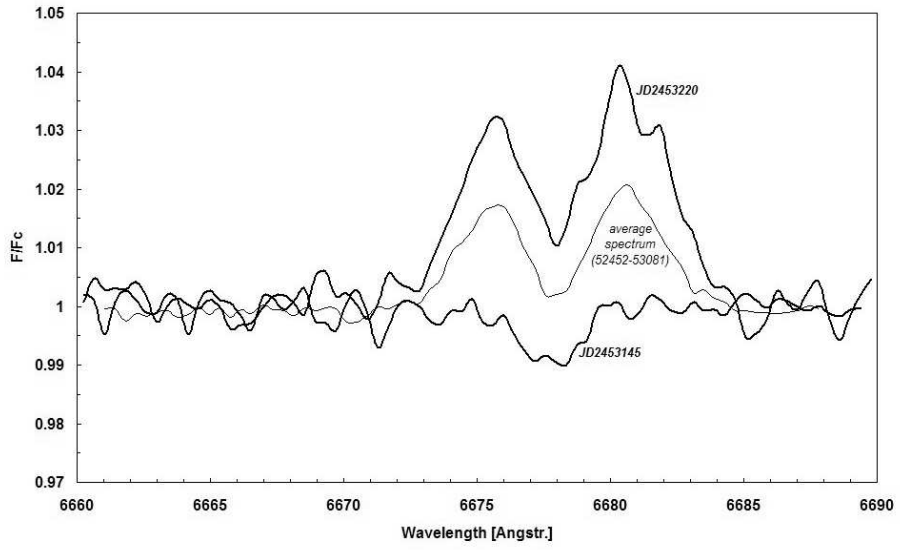

Figure 2. Comparison of the "average normal spectrum" to the He I 6678 absorption spectrum at JD 2453145 and maximum emission spectrum at JD 2453220.

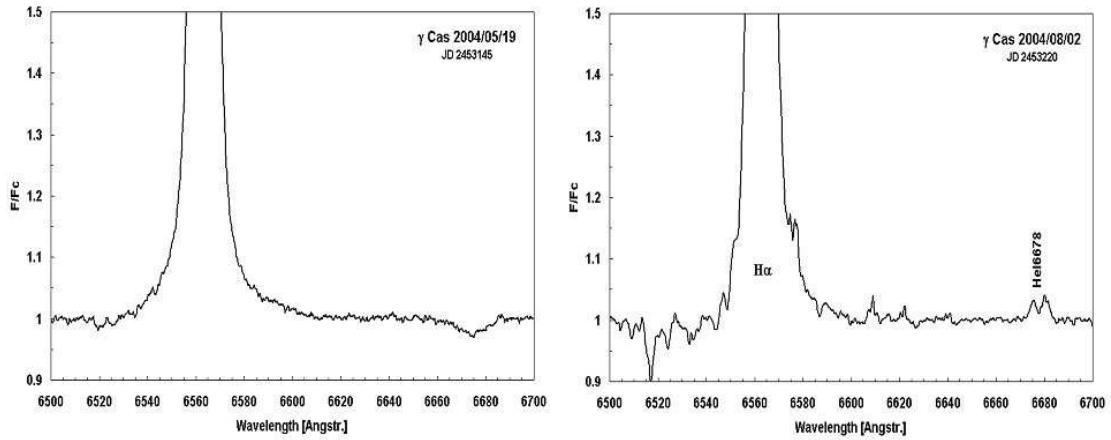

Figure 3. Detail of the spectra of the "extreme events" at JD 2453145 and JD 2453220 in the 6500–6700 Å section.

To find any correlation between He I 6678 activity and Hα emission we show EW(v+r) and EW(Hα) in Fig. 1. With our Hα error bars of 5 Å we are not able to claim for any EW correlation between these two lines within the time interval of JD 2453140–340. It seems, that in certain exceptional cases γ Cas shows a more or less constant emission activity of the H I 6678 line of 1–2% of the continuum, as visible in our average normal spectrum and as seen by Smith (1995). For this reason a further continuous monitoring seems to be of large interest.

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3.2. The Third Announcement of an International Workshop on Active OB-Stars: Laboratories for Stellar & Circumstellar Physics

August 29 – September 2, 2005
Hokkai-Gakuen University, Sapporo, Japan
sponsored by
Japan Society for the Promotion of Science and
The 21st Century COE Programme on
Topological Science and Technology
http://www.kwasan.kyoto-u.ac.jp/be2005/

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Dear Colleagues,

We are sending you the third announcement of the international workshop on Active OB-stars: Laboratories for Stellar & Circumstellar Physics to be held at Hokkai-Gakuen University, Sapporo, Japan, for August 29 – September 2, 2005. In this announcement we mainly provide you the scientific programme and the local information including the social programme. The first and the second announcements as well as a list of participants and submitted abstracts are found in the web site at `http://www.kwasan.kyoto-u.ac.jp/be2005/`. For registration, accommodation, and local transportation, please see the 2nd announcement or corresponding pages of the above web site. The next (final) announcement will have more local information.

DEDICATION

The workshop will be dedicated to the work of Prof. Mike Marlborough (University of Western Ontario, Canada), Prof. Ryuko Hirata (University of Kyoto, Japan) and Dr. Anne-Marie Hubert (Observatoire de Paris-Meudon, France), who all have been pioneers of the physical modeling of mass-loss and circumstellar disks of Be stars as well as of their observational studies for several decades. We have also decided to dedicate the proceedings to the memory of Dr. John Porter, who died young recently. With his original and brilliant ideas, he has made a lot of important contributions to this field.

PROGRAMME

The workshop is divided into five sessions with different themes. Each session will be composed of invited reviews, contributed oral presentations and discussion sessions, which will take place at the end of each programme unit. There are three kinds of talks: review talks (45 min), regular contributed talks (25 min) and short contributed talks (20 min). Posters, 90cm x 180cm maximum, will be at display during the entire workshop. There will be ample time for poster viewing during breaks.

Below is the detail of the sessions.

Sunday, Aug 28

18:00-20:00 Registration and welcome reception

Monday, Aug 29

09:00 Opening of the meeting

Session 1: Active OB-stars: past, present and future

09:20 S. Owocki: Overview of Active OB-Stars
10:05 I. Howarth: Observational Inference of Active OB Star Rotation Rate
10:50 Coffee break
11:20 A.-M. Hubert: Statistical inference of Be star periodicity
12:05 End of the morning session

Session 1 (continued)

14:30 Discussion session

Session 2: Dynamical processes

15:00 U. Lee: Coupling of rotation and pulsation in OB stars
15:45 S. Jankov, A. Domiciano de Souza, F. Vakili et al.: New Interferometric Constraints on the Physics of Active OB-Stars
16:10 J. Telting et al.: A high-resolution spectroscopy survey of beta Cephei pulsations in bright stars
16:35 Coffee break
17:05 K. Uytterhoeven: An observational study of line-profile variable B stars in multiple systems
17:30 N. A. Miller: New perspectives on B star X-ray emission: The high-resolution X-ray spectra of Spica and Beta Cen
17:55 J. Gutierrez-Soto, J. Fabregat, J. Suso et al.: Nonradial pulsators Be Stars: NW Ser and V1446 Aql
18:15 Discussion session
18:45 End of the Monday program

Tuesday, Aug 30

Session 2 (continued)

09:00 Coralie Neiner: B-field measurements of OB stars
09:45 R. Vallverdu, L. Cidale, R. Rohrmann: The influence of a Lorentz force in the line profile of early-type magnetic stars
10:10 R. Townsend: Sigma Ori E: The Archetypal Rigidly Rotating Magnetosphere
10:35 Coffee break
11:05 C. Motch, R. Lopes de Oliveira, I. Negueruela, F. Haberl, E. Janot-Pacheco: X-ray and optical properties of new Gamma-Cas like objects discovered in X-ray surveys
11:30 B. Willems: Dynamical tides of close binaries
12:15 Discussion session
12:45 End of the morning session

Afternoon session

Session 3: Stellar mass loss as origin of circumstellar material

14:30 J. Krticka: Radiatively driven winds of OB stars
15:15 V. Votruba, A. Feldmeier, J. Kubat, R. Nikutta: Time dependent models of multicomponent stellar winds
15:40 S.C. Searle, R.K. Prinja, D. Massa: The stellar winds of early Galactic

B supergiants
16:05 Coffee break
16:35 A. Kaufer, O. Stahl, R.K. Prinja: The photosphere - wind connection in HD 6476
17:00 R. Blomme: Structure in the winds of OB stars: radio and millimetre observations
17:20 Discussin session
17:50 T. Rivinius: Links between photospheric activity and formation of circumstellar structures of Be stars
18:35 A. ud-Doula: Centrifugal Breakout of Magnetically Confined Line-Driven Stellar Winds
19:00 End of the Tuesday program

Wednesday, Aug 31

Session 3: (continued)

09:00 N. Smith: Observations of Extreme Mass Loss Activity from Luminous Evolved Stars: Eta Carinae, RY Scuti, and the LBVs
09:25 Discussion session
09:55 End of session 3

Session 4: Structure and dynamics of circumstellar disks

09:55 A.T. Okazaki: Theory vs. observation of circumstellar disks and their formation
10:40 Coffee break
11:10 A.C. Carciofi, J.E. Bjorkman: Modeling the structure of hot star disks: a critical evaluation of the viscous decretion scenario
11:35 H. Iwamatsu, R. Hirata: Non-LTE Calculation for the Decretion Disk
12:00 Discussion session
12:30 End of the Wednesday program

Afternoon - Conference trip

13:00-19:00 Half-day bus trip for Otaru

Thursday, Sep 1

Session 4 (continued)

09:00 K. Bjorkman: Polarimetric observations of the circumstellar matter and their interpretation
09:45 R. Hirata: Disk precession in Pleione
10:10 S. Stefl, A.T. Okazaki, Th. Rivinius, D. Baade: V/R variations of binary Be stars
10:35 J. Kubát: Radiation force and circumstellar disks
10:55 Coffee break
11:25 O.Chesneau: Interferometric measurements of fast rotating OB stars and circumstelar disks
12:10 Ph. Stee, A. Meilland: First Observations of the Be Star alpha Ara with the VLTI
12:30 End of the morning session

Afternoon session

Session 4 (continued)

14:00 V. McSwain: CHARA Array Interferometric K-band Observations of the

Disks of Be Stars
14:25 Discussion session
14:55 Coffee break

Session 5: Evolutionary effects in active OB-stars
15:25 Georges Meynet: Rotational evolution of massive stars
16:10 Wolfgang Glatzel: Activity of OB stars and their evolution
16:55 End of the Thursday program

18:30-21:30 Conference dinner

Friday, Sep 2
Session 5 (continued)
09:00 M.V. McSwain, D.R. Gies: The Evolutionary Status of Be Stars
09:25 C. Martayan, Y. Fremat, M. Floquet et al.: Studies of large samples of B & Be stars in Magellanic Clouds with VLT-FLAMES at ESO
09:50 J. Fabregat: Observational evidence of the evolutionary enhancement of the Be phenomenon
10:10 D. McDavid, A. Crisp: The Upper Main Sequence of the Open Cluster NGC 2169
10:30 Coffee break
11:00 I. Negueruela: The role of multiplicity
11:45 A. Marco, I. Negueruela, C. Motch: Blue stragglers, Be stars and X-ray binaries in open clusters
12:10 End of the morning session

Afternoon session
Session 5 (continued)
14:00 A.T. Okazaki (K. Hayasaki): Interaction between the Viscous Decretion Disk and the Neutron Star in Be/X-Ray Binaries
14:25 C. Arranz, C.A. Wilson et al.: INTEGRAL & RXTE observations of the Be/X-ray binary EXO 2030+375 during outburst
14:45 Discussion session
15:35 Coffee break
16:05 D. Baade: Summary talk
16:35 Closing ceremony, end of the meeting

PROCEEDINGS

The proceedings of the workshop will be published in the ASP Conference Series, and the editors will be S. Štefl (chief editor), S. Owocki and A. Okazaki. The number of poster papers included in the proceedings will be limited up to two poster papers per registered lead author and one poster paper per unregistered lead author. Preliminary page limitations are 12 pages for review talks, 7 pages for contributed talks and 3 pages for posters. The required style files will be made available on our web site later.

SOCIAL EVENTS

We are planning several social events; Welcoming reception, Excursion tour, Banquet, and Cultural programme for accompanying guests. Please notice that the cultural programme also needs reservation. If you and/or your guests are interested in the cultural programme, please let us know by email well before the workshop.

- Welcoming reception at Hokkai-Gakuen University
  Sunday, Aug 28, in the evening from 18:00 to 20:00. Fee: free.

- Excursion: a half-day guided bus tour to OTARU.
  Wednesday, Aug 31, in the afternoon from 13:00 to 19:00. We will visit the TANAKA brewer, the AOYAMA's honored house, and the KITAICHI glass studio. Fee: 3,000 JPY per person, which covers business lunch.

- Banquet at Hotel Sapporo Garden Palace
  Thursday, Sep 1, in the evening from 18:30 to 21:30. Buffet style. Fee: 5,000 JPY per person.

- Kimono Wearing and Japanese Tea Ceremony (Sado)
  Thursday, Sep 1, in the morning from 9:30 to 13:00. This is a programme for accompanying persons. We will meet at the registration desk at 9:30 a.m. and then move to the Sapporo Guest House, where the programme will be held. We will return to the univesity around 13:00. For more details, see the explanation below. Please let us know if you and/or your guests are interested in this programme. Fee: free.

  (1) Kimono Wearing
  A chance is provided for both males and females to try on traditional Japanese clothing, taking a look at the art of putting on a kimono plus the history and culture behind its origin. Simple step-by-step instructions allow even a novice to wear the intricate silk gowns with dignity, and the resulting photographs will surely serve as a unique reminder of your time in Japan.

  (2) Japanese Tea Ceremony (Sado)
  Japanese green tea actually originated in China and was brought to Japan in the 12th century, where it developed into a ceremony that has become one of the countrys traditional art forms. Learn a little of the history behind sado, or the way of tea, and join in a ceremony dedicated to the making and drinking of this Zen-influenced drink.

REGISTRATION AND ACCOMMODATION

For any change of your booking, please contact our agent, HOKKAIDO UNIVERSITY COOP (or HUC):

HOKKAIDO UNIVERSITY COOP (HUC)
c/o Congress Organizing Division
KITA 8 JO NISHI 8, KITA-KU, SAPPORO
060-0808 JAPAN
FAX +81-11-746-8106
E-mail gakkai@coop.hokudai.ac.jp

VISA

If you have to get a visa to attend the workshop, please contact us as soon as possible.

CONFERENCE FACILITIES

The conference room is equipped with a visual presenter for transparencies (or other materials) and a data projector for laptops. A laptop, in which Windows XP, PowerPoint and Acrobat Reader are installed, is also available. If you want to use our laptop, bring us your

files on a USB memory stick or a CD well before your presentation. Although you can also use your own laptop for your presentation, it is a good idea to bring a back-up copy of your presentation on a CD just in case of any incompatibility problems. There are two screens in the room, so you can use both of visual presenter and data projector simultaneously.

Posters will remain on display during the whole meeting, along the corridor outside the conference room. Each poster board is 90cm wide and 180cm high.

We are planning to make several PCs available for internet connection, e.g., SSH connection to remote servers and web browsing, at a room next to the conference room. Since the conference building is shielded by a firewall and no PC can be connected to the internet without permission, we will also have a room, in which you can connect your laptop to the internet, in a building next to the conference building.

IMPORTANT DATES

Aug 15, 2005: Final announcement.
Aug 28, 2005: Welcome reception.
Aug 29 - Sep 2, 2005: Workshop,
Aug 31, 2005: Excursion,
Sep 1, 2005: Cultural programme for accompanying guests,
Sep 1, 2005: Banquet.

SCIENTIFIC ORGANIZING COMMITTEE

Conny Aerts (Belgium)
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Hideyuki Saio (Tohoku University)

3.3. A new and rapidly developing emission-line phase of HD 6226 detected

Miroslav Šlechta[1], Daniela Korčáková[1], and Petr Harmanec[2,1]
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Received: 3 November 2005; Accepted: 4 November 2005

The Be star HD 6226 (SAO 36891, BD+46°245, R.A.$_{2000}$ = 01:03:53.3587, Decl.$_{2000}$ = +47:38:32.262) is a rather little studied object despite its brightness ($V = 6\overset{\text{m}}{.}8$).

Its light variability was discovered by Božić and Harmanec (1998) (A&A, 330, 222). They expressed a suspicion that HD 6226 could be an unrecognized Be star with alternating absorption and emission epochs.

The Hα emission was indeed discovered by McCollum et al. (2000) (Paper #129.10 of the 197$^{\text{th}}$ meeting of AAS). Alternating B⇌Be phases and corresponding long-term light variations were documented and studied by Božić et al. (2004) (A&A, 416, 669). They also discovered periodic radial-velocity variations of the deepest parts of line profiles with a $2\overset{\text{d}}{.}625$ period. This periodicity was confirmed and another Be episode was reported by Šlechta and Škoda (2005) (Ap&SS, 294, 179).

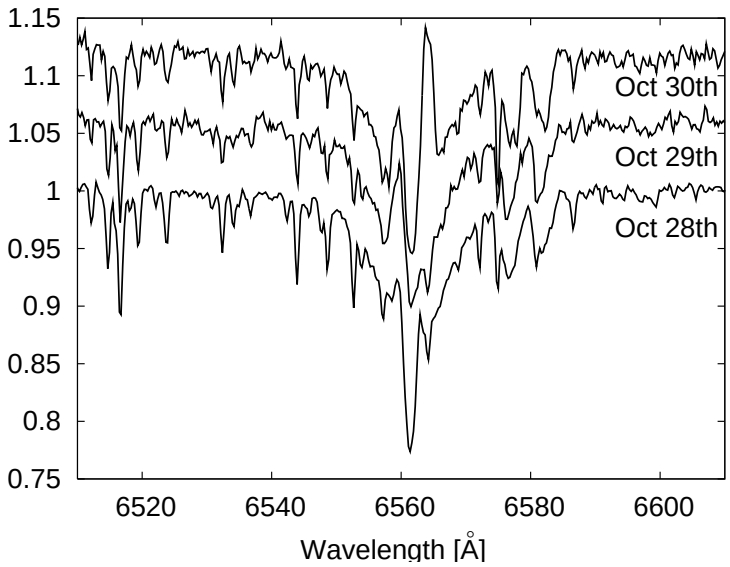

Figure 1. The Hα line profiles of HD 6226 obtained on three consecutive nights in October 2005. A very dramatic development of the emission is seen.

It seems that the onset of new Be episodes is very rapid (on a time scale of a few days) and quite spectacular.

A new B→Be transition was detected between Oct 28 and 29, 2005 with a coudé spectrograph attached to the Ondřejov 2-m telescope. The increase of the emission strength was

confirmed in Oct 30, 2005 with the same instrument - see Fig. 1.

We alert all interested observers to obtain more spectral and photometric observations of this interesting object.

Acknowledgement

This study was supported from the research plans J13/98: 113200004 and K2043105 and from the grant GA ČR 205/2003/0788.

3.4. An unexpected emission-line phase of HD 6226 detected

Miroslav Šlechta[1]
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Received: 25 January 2006; Accepted: 30 January 2006

The Be star HD 6226 (SAO 36891, BD+46°245, R.A.$_{2000}$ = 01:03:53.3587, Decl.$_{2000}$ = +47:38:32.262) is very interesting and seems to be more and more exciting object.

We informed (Šlechta et al., *Be Star Newsletter*, earlier in this Volume; for a short review on the history of its studies see therein) about detection of unexpected emission-line phase. However, this emission-line phase was quite short - Charles T. Bolton (Dept. of Astronomy and Astrophysics, Univ. of Toronto, Ontario, Canada) secured spectrum of HD 6226 in December 17, 2005, in Hα region and found only a slight bump on the blue wing; the core was probably filled but without any visible structure (priv. communication).

We should remark that Thomas L. Gandet (Lizard Hollow Observatory, Tucson, AZ, USA) photometrically observed HD 6226 in November 12, 2005, in V-band (priv. communication). He found none photometric variations (or they were of order of errors).

Really, our spectrogram, secured in January 10, 2006 (this lag is due to the weather conditons) in Hα region, showed no emission but small bump on the blue wing, as it was mentioned by Charles T. Bolton.

However, the new spectrogram secured in January 15, 2006, showed the emission in Hα again. The rapid evolution of emission phase was confirmed in January 22 when strong emission was found on secured spectrum – see Fig. 1. Thus the new emission phase started probably about January 10, 2006.

It means that nowadays the behaviour of HD 6226 is quite dramatic and unpredictable. It is surprising in comparison with the behaviour in past years – see Šlechta & Škoda 2005, Ap&SS, 296, 179. In cited paper we presented our spectroscopic observation of HD 6226 during 2003. At the beginning of that stage, we found the object in an emission phase. The emission strength systematically decreased up to August 11, 2003, when the last emission was secured. The following spectrum, saved in August 25, 2003 (the pause was due to the weather), showed typically absorption profile of Hα without any emission remnants. This absorption phase continued up to October 28, 2003, when new strong emission line was detected. The emission phase was confirmed by Thomas L. Gandet in the Hβ region (priv. communication). His spectrum (secured in October 1, 2003 via coude spectrograph attached to the 0.9m telescope at Kitt Peak) shows double-peaked emission pattern in the core of Hβ, but not exceeding the level of continuum.

The strength of the emission decreased up to January 14, 2004. Then the bad weather

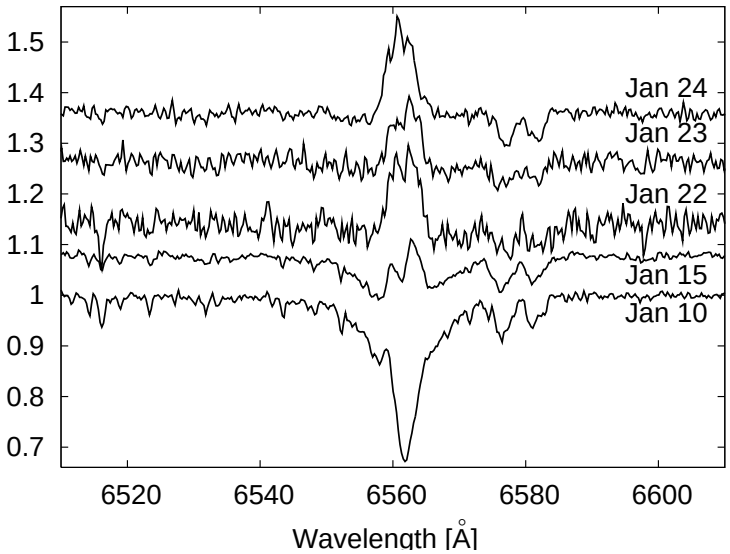

Figure 1. The Hα line profiles of HD 6226 obtained in January, 2006. Possible beginning of another emission phase. The last three consecutive spectra are quite poor due to the observational conditions. However, one can see that strength and profile of Hα emission has changed.

made impossible to observe the star up to March 22, 2004, when absorption spectrum was saved. The spectrum secured in March 30, 2004, confirmed absorption phase of HD 6226.

The first autumn spectrum of HD 6226 was exposed in August 7, 2004, and showed new emission phase which continued up to April 3, 2005 (!). Then HD 6226 was not observable in Ondřejov up to autumn; the first spectrum exposed in August 19, 2005, showed absorption profile.

The new unexpected emission was observed between October 28 and 29 as we announced in mentioned *Be Star Newsletter*. Then the emission disappeared and returned about January 10, 2006. Since this date the emission phase continued up to January 24, 2006, when we secured the last spectrum until now.

Perhaps, it is premature to put a hypothesis on such dramatic change in the behaviour of this object. However, it is possible to say that the behaviour of the HD 6226 dramatically accelerated during the last year. It would be very interesting to observe the HD 6226 as often as possible and watch whether this epoch of instability is (or is not) impermanent and how long will remain.

Acknowledgement

This study was supported from the research plans J13/98: 113200004 K2043105, AV0Z 100/30501 and from the grants GA ČR 205/2003/0788 and GA AV ČR B/301/630/501.

3.5. Pleione (28 Tau) is now forming a new disk!

Jun-ichi KATAHIRA[1], Shin-ya NARUSAWA[2], Shinobu OZAKI[2], Kazutoshi INOUE[3], Yoshihito KAWABATA[4], Kozo SADAKANE[5], & Ryuko HIRATA[6]

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Received: 9 February 2006; Accepted: 10 February 2006

Pleione (28 Tau) has started its new shell activity. On December 15, 2005, we found a broad and shallow absorption feature of the Ca II K-line, which is known as the precurser of a new shell activity cycle (Gulliver 1977, ApJS 35, 441). The Ca II K-line absorption profile is characterized by the total width of 1200 $\mathrm{km\,s^{-1}}$ at the continuum, the half half-width of 200 $\mathrm{km\,s^{-1}}$, the central depth of 0.08, and the equivalent width of 0.45 Å. The spectrum was obtained at the Nishi-Harima Astronomical Observatory with a new spectrograph attached to the Nasmyth focus of the 2m-reflector, *NAYUTA*. The spectral resolving power was R =7000–9000 and the S/N ratio was about 450.

A follow-up observation carried out with the similar spectral resolution at the Bisei Astronomical Observatory on January 14, 2006 showed that the Ca II K-line became further deeper. Figure 1 shows the profile variation of the Ca II K-line from 2004 December to 2006 January.

The emission strengths of the Hα and Hβ lines were still strong in the course of their steady decrease after the year 2000. However, we found that the central shell absorption components of the Balmer lines have started to develop. Figure 2 shows the profile variation of the Hβ line.

The singly-ionized metallic lines (Fe II, Ti II, and Cr II, etc.) are characterized by a broad and shallow absorption with the total width of about 500 $\mathrm{km\,s^{-1}}$, and a superposed central weak emission-like feature without a sharp shell component (see the Ti II line at 3914 Å plotted in Fig.1, for example). We further noticed that the Fe I lines at 4046 Å and 4064 Å also show the profile chracteristics similar to the singly-ionized metallic lines, with the central depth of only 0.02–0.03.

Pleione is now in the very early stage of a new disk formation process, which started within one year, as judged from our observation in 2004 December. We would like to encourage any Be-star observers to include Pleione on their observing list in spectroscopy, photometry, or polarimetry.

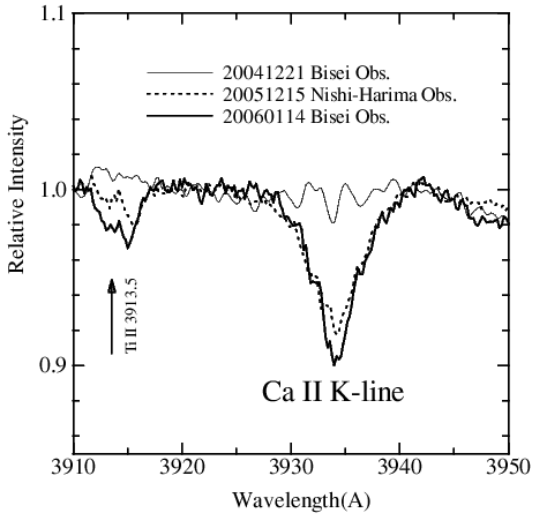

Figure 1. Ca II K-line profiles from 2004 December to 2006 January.

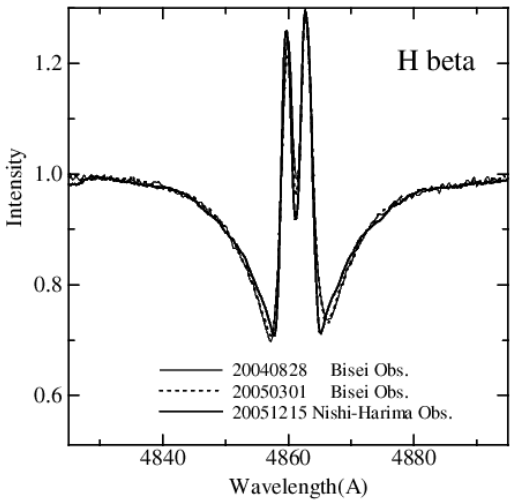

Figure 2. Deepening of the central shell absorption components at Hβ line from 2004 August to 2005 December.

3.6. Mu Centauri in a extremely bright visual state

Sebastian Otero
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Received: 12 February 2006; Accepted: 12 Feb 2006

The Southern Be star mu Centauri is extremely bright right now, shining at $V = 3.1$ on February 12. AAVSO data (Henden 2006) from 1984 to the present suggest that the star never got as bright as its current state. The first visual observations obtained this season show a bright state since at least late January but the brightening has turned into an impressive event. Two lightcurves are provided. Figure 1 shows observations from January 1998 to the present. The previous brightest state can be seen around JD 2452081 (June 21, 2001) when the star reached $V = 3.3$ (Baade et al. 2001). Figure 2 shows the current event.

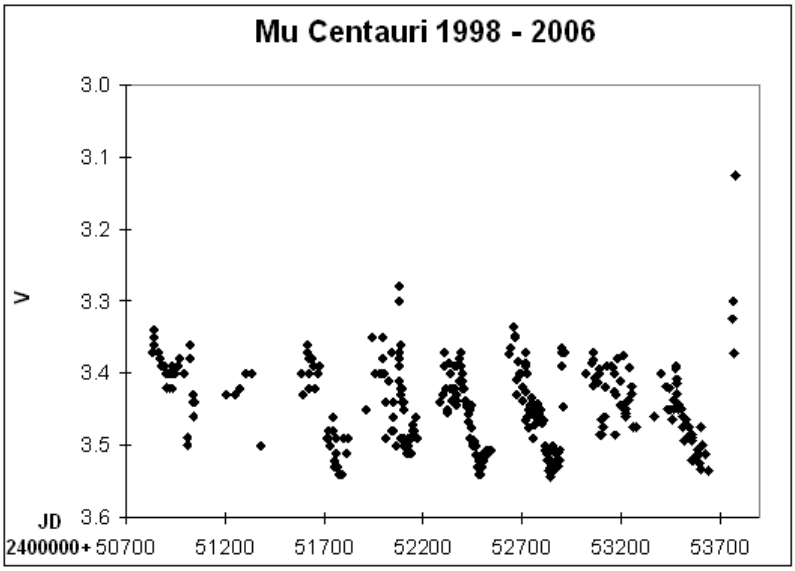

Figure 1.

The most recent visual observations by S. Otero are:

2005	Aug.	29.981	$V = 3.50$
2005	Sep.	12.958	$V = 3.51$
2005	Sep.	27.964	$V = 3.54$
2006	Jan.	28.180	$V = 3.30$
2006	Jan.	29.308	$V = 3.33$
2006	Feb.	05.310	$V = 3.37$
2006	Feb.	12.314	$V = 3.13$

Follow-up observations are encouraged.

Best wishes,
Sebastian

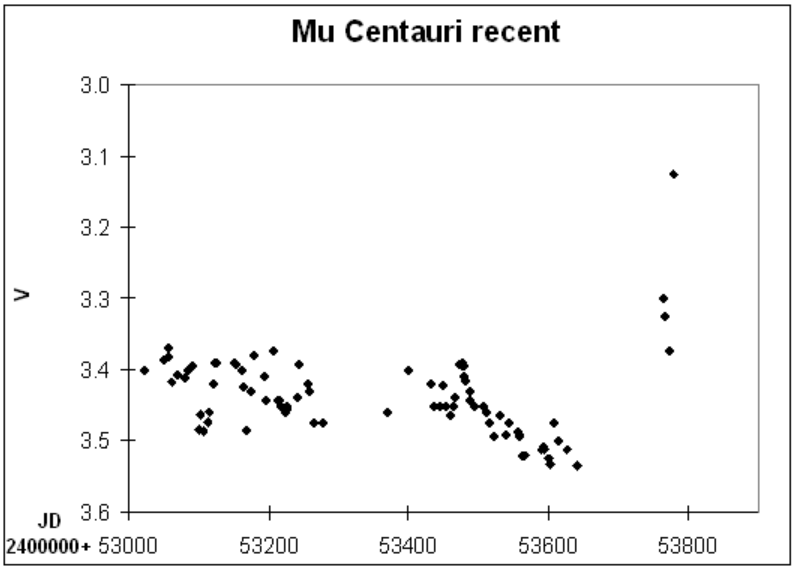

Figure 2.

References

Baade, D., Rivinius, T., Štefl, S., Otero, S., & Liu, X. 2001, IAU Circ., 7658, 2, ed. Green, D.W.E. Henden, A.A. 2006, Observations from the AAVSO International Database, private communication

3.7. Hα Emission Line Wings in θ CrB

Karen S. Bjorkman, Nancy D. Morrison, & Erica N. Hesselbach
Ritter Observatory
Dept. of Physics & Astronomy
University of Toledo, Toledo, OH 43606-3390
email: karen@astro.utoledo.edu
Received: 1 March 2006; Accepted: 2 March 2006

Abstract: We note the presence of Hα emission wings in a recent spectrum of the Be star θ CrB, and suggest that frequent monitoring of the star over the next few months would be appropriate.

Current Status of θ CrB

Rivinius et al. (2003) indicated the possible development of a new emission phase of the well-known Be star θ CrB in 2003, after nearly 20 years of inactivity. In a recent spectrum obtained by Nancy Morrison on 26 Feb 2006 with the 1-m telescope and échelle spectrograph at the Ritter Observatory, clear evidence of strong emission line wings at Hα is noted (see Figure 1). We publish this preliminary spectrum here in the hopes of prompting careful monitoring of this star over the next few months, so that any further development of the emission phase can be followed in detail.

Acknowledgments

We are grateful to the Ritter Observatory observing team for their help with data acquisi-

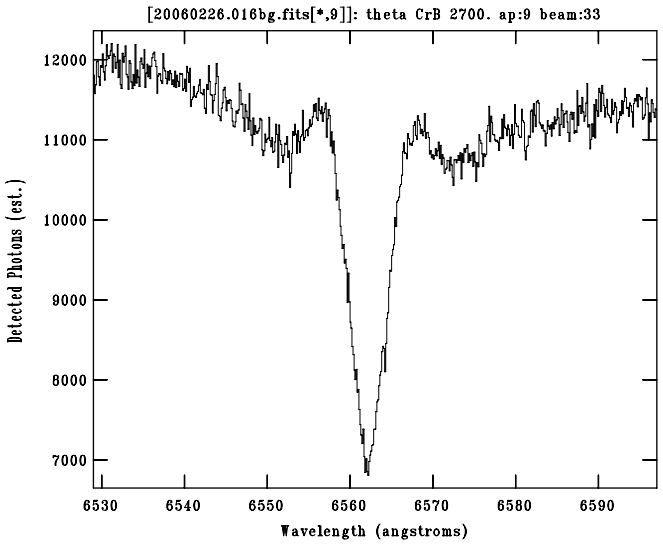

Figure 1. Hα spectrum of the Be star θ CrB obtained at the Ritter Observatory on 2006 Feb 26 (UT). Note the strong emission line wings. This is a preliminary reduction, and does not include telluric line removal or heliocentric correction.

tion, and especially to Robert Burmeister, whose care and efforts keep the telescope running smoothly. Observations at the Ritter Observatory are supported by NSF under the PREST program, grant number 0440784.

References

Rivinius, T., et al. 2003, Be Star Newsletter, vol. 36.

3.8. New On-line Catalogue of Be/X-ray binaries and candidates (permanently updated version)

Natalya V. Raguzova
Sternberg Astronomical Institute
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Received: 28 March 2006; Accepted 12 April 2006

Dear Colleagues,

I present new on-line catalogue of Be/X-ray binaries and candidates in the Galaxy and in the Large and Small Magellanic Clouds. This catalogue contains more than 140 sources and provides information on names and spectral types of optical components, distances, on spin characteristics of neutron stars, and on orbital and X-ray properties of binary systems. We give brief comments on each object and provide necessary references to original data.

This catalogue is an extended and updated version of papers by Raguzova & Popov (2004, 2005). The catalogue database will be continuosly updated. Comments are welcomed. The catalogue is available at `http://xray.sai.msu.ru/ raguzova/BeXcat/`.

References

Popov S.B. & Raguzova N.V. 2004, astro-ph/0405633
Raguzova N.V. & Popov S.B. 2005, astro-ph/0505275
Raguzova N.V. & Popov S.B. 2005, A&AT, 24, 151

3.9. Be star V408 Lac outburst in progress?

Thom Gandet
Lizard Hollow Observatory
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email: tlglhobs@comcast.net
Received: 12 October 2006; Accepted: 12 October 2006

Dear Be-star colleagues,

An outburst of the late-type Be star, V408 Lac (HD 212791), was observed at Lizard Hollow Observatory on 23 Sept 2006. On that date it was brighter than the brightest Hipparcos magnitude, but has since faded. Recent observations are:

V408 Lac		
UT Date	HJD	V
23 Nov 2003	2452966.6502	8.035
23 Sep 2006	2454001.6569	7.844
08 Oct 2006	2454016.6887	8.052
10 Oct 2006	2454018.9430	8.053

V408 Lac's maximum of 7.84 on 23 Sept 2006 at least equals the maximum observed by Hipparcos. The very rapid fading of $\sim$0.2 mag over two weeks we observed is far more precipitous than any drop observed by Hipparcos. As shell lines have been previously seen in the spectrum, perhaps this star is entering an interesting active transition period!

The comparison star was HD 212636, using $V = 8.510$, $B-V = 0.004$ (derived from Tycho). I will photometrically observe V408 Lac through out this season, but only intermittently.

Best regards and good observing!
Thom Gandet

3.10. Astrophysics Software Database

Sebastian Wolf & Matthias Kleiser
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Königstuhl 17, D-69117 Heidelberg
email: swolf@mpia.de
Received: 9 November 2006; Accepted: 19 January 2007

The ASTROPHYSICS SOFTWARE DATABASE (ASD) was created with the goal to provide an easy-to-use tool for the many different areas of astrophysics where software is developed and used.

Main Goals

- Foster the communication between developers and users of astrophysical software

- Provide an overview about existing software solutions in the community

You are invited to post a description of *your* software projects at `http://www.mpia.de/ASD` in order to make your work "visible" to the entire astronomical community.

This concerns data reduction and analysis software, simulation codes, databases, instrument software, software lists, etc.

3.11. Pleione fading

Sebastian Otero
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Received: 13 November 2006; Accepted: 19 January 2007

Dear Be-star colleagues,

The bright Be star BU Tau (Pleione) is in a faint V magnitude state right now, as expected because of the new Be-shell phase discovered earlier this year by Katahira et al. (2006). Previous Be-shell phases started in 1938 and 1972 which means there is a remarkable periodicity in Pleione's changes. This is consistent with the star being a binary system with a 34-35 year orbital period as suggested in Luthardt & Menchenkova (1994). The visual magnitude of the star is around $V = 5.4$ (November 13, 2006), 0.4 mag. fainter than its normal state.

Lightcurve available:

`http://ar.geocities.com/varsao/BUTau_recent.gif`

Best wishes,
Sebastian

References

Katahira, J., et al. 2006, The Be Star Newsletter, Vol. 38
Luthardt, R. & Menchenkova, E.V. 1994, A&A, 284, 118

4. COMMUNITY COMMENTS

As editors we occasionally receive comments from our readership that we feel would be worthwhile sharing with the active B star community. We have thus decided to launch a new section in the Be Star Newsletter entitled Community Comments. It is our intention to publish these e-mails with only minimal editing in order to preserve the original flavor of the communication. Please send Community Comments to `benews@mucen.usc.edu` with a copy to `dam3ma@virginia.edu`. Our first item comes from Petr Harmanec.

Gerrie Peters

1. From: Petr Harmanec
   Date: Mon, 21 Nov 2005 13:46:33 +0100 (CET)
   To: Dr. Geraldine J. Peters,
   Dr. David McDavid
   Subject: Re: Be Star News Update (fwd)

   Dear Gerrie and David,

   I am pleased in the continuing interest in Bpe stars but I would like to remind the community that it was found quite some time ago (Hunger et al. 1989 A&A 224, 57) that V1030 Ori = HD 37479 is a field star, not a true member of the sigma Ori cluster. It would be wise to stop using the name sigma Ori E for this star, I believe.

   My very best wishes to both of you

   Petr

2. From: Nolan Walborn
   Date: Wed, 21 Dec 2005 21:44:55 -0500 (EST)
   To: Dr. Geraldine J. Peters,
   Dr. David McDavid
   Subject: Re: Be Star News Update

   Hi. I have a Community Counter Comment to that of Petr Harmanec regarding the location of Sigma Ori E. As acknowledged by Hunger et al. (A&A 224, 57, 1989), the magnitudes and colors of components D and E are very similar, and both share very similar radial velocities and extinctions with AB. On the other hand, they fail to mention that E and AB also share a common proper motion (according to the notes in the Third Edition of the Bright Star Catalogue). Moreover, the Orion Association is at an extreme of the Gould Belt, far out of the Galactic Plane, so any distant background B star would have to be a runaway, for which there is no evidence in this case.

   As also acknowledged by Hunger et al., Sigma Ori E has a very peculiar and variable spectrum, for which they try their best to compensate in their careful analysis, but the very sensitive gravity determination,

on which their distance is based, is quite uncertain. I recommend that any reader seriously interested in this problem read their paper in detail. Moreover, the atmospheric structure and extent of this peculiar object may well be different from those of the normal comparison stars, which would produce systematic effects not accounted for in their analysis. It is quite difficult to derive accurate spectroscopic masses for even normal OB stars, and the results are frequently discrepant with those from other methods.

In conclusion, we may hope that Gaia and/or SIM will eventually tell us where the OB stars really are! In the meantime, it is highly premature to banish Sigma Ori E from the multiple system. Saludos!

5. ABSTRACTS

Influence of the Coriolis force on the instability of slowly pulsating B stars

R. H. D. Townsend[1,2]

[1] Bartol Research Institute, University of Delaware, Newark, DE 19711, USA

[2] Department of Physics & Astronomy, University College London, Gower Street, London WC1E 6BT, UK

This paper explores the effect of rotation on the κ-mechanism instability of slowly pulsating B stars. A new nonadiabatic code, that adopts the so-called 'traditional approximation' to treat the Coriolis force, is used to investigate the influence exerted by rotation over the stability of stellar models covering the mass range $2.5\,\mathrm{M}_\odot \leq M \leq 13.0\,\mathrm{M}_\odot$. The principal finding is that, for all modes considered apart from the prograde sectoral class, rotation shifts the κ-mechanism instability toward higher luminosities and effective temperatures; these shifts are accompanied by broadenings in the extent of instability strips. Such behaviour is traced to the shortening of mode periods under the action of the Coriolis force. Instability strips associated with prograde sectoral modes behave rather differently, being shifted to marginally lower luminosities and effective temperatures under the influence of rotation.

The implications of these results are discussed in the context of the observational scarcity of pulsation in B-type stars having significant rotation; various scenarios are explored to explain the apparent dichotomy between theory and observations. Furthermore, the possible significance of the findings to Be stars is briefly examined.

2005 MNRAS, 360, 465

On the evidence for disks around Blue Straggler stars

John M. Porter[1] **and R. H. D. Townsend**[2,3]

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Recent observations of blue stragglers by De Marco et al. (2004) have revealed continuum deficits on the blue side of the Balmer discontinuity, leading these authors to infer the presence of discs around the stars. This intriguing possibility may throw light on aspects of the mechanisms responsible for at least some of these objects; current theories of blue straggler formation invoke stellar collisions or interacting binaries, both of which appear capable of forming a circumstellar disc.

However, by synthesizing photospheric spectra for models of rotating blue stragglers, we demonstrate that the Balmer jump enhancements can be wholly attributed to the influence of oblateness and gravity darkening on the formation of the continuum. Therefore, we are led to conclude that the observations of De Marco et al. can be ascribed a more prosaic explanation, that of rapid stellar rotation arising from the merger/interaction formation process.

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Rotation, pulsations and outbursts in the Be star υ Cyg (HD 202904)

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υ Cyg is a Be star that shows variations at all timescales. We monitored its spectrum for several years from 1998 to 2004 and, in particular, during a spectroscopic multisite campaign in 2000. In this paper we present and analyse the data. We observed several outbursts including an intense one in 2000. Moreover, we found several periods of short-term variations, including two frequencies at 2.95 and 2.6 c d^{-1}, which are well reproduced by models of non radial pulsations with a retrograde mode with ℓ=3 and m=3 and a zonal mode with ℓ=3 or 4 and m=0, respectively. The stellar rotation is probably also identified at f$\sim$1.5 c d^{-1}, which is coherent with the rotation frequency deduced from our determination of stellar parameters. The peak-to-peak amplitude of variations also seems to vary in time, maybe due to a beating effect between close frequencies, but the resolution in time of our data does not allow us to separate such close frequencies. Finally, a longer timescale variation may be present, with a period around 11 years, which could be associated with a binary companion.

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Effects of gravitational darkening on the determination of fundamental parameters in fast rotating B-type stars

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In this paper we develop a calculation code to account for the effects carried by fast rotation on the observed spectra of early-type stars. Stars are assumed to be in rigid rotation, and the grid of plane-parallel model atmospheres used to represent the gravitational darkening are calculated by means of a non-LTE approach. Attention is paid to the relation between the *apparent* and *parent non-rotating counterpart* stellar fundamental parameters and apparent, and true $V \sin i$ parameters as a function of the rotation rate $\Omega/\Omega_{\rm c}$, stellar mass, and inclination angle. It is shown that omitting of gravitational darkening in the analysis of

chemical abundances of CNO elements can produce systematic overestimation or underestimation, depending on the lines used, rotational rate, and inclination angle. The proximity of Be stars to the critical rotation is revised while correcting not only the $V \sin i$ of 130 Be stars, but also their effective temperature and gravity to account for stellar rotationally induced geometrical distortion and for the concomitant gravitational darkening effect. We concluded that the $V \sin i$ increase is accompanied by an even higher value for the stellar equatorial critical velocity, so that the most probable average rate of the angular velocity of Be stars attains $\Omega/\Omega_{\rm c} \simeq 0.88$.

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On the evolutionary status of Be stars. I. Field Be stars near the Sun

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A sample of 97 galactic field Be stars were studied by taking into account the effects induced by fast rotation on their fundamental parameters. All program stars were observed in the BCD spectrophotometric system in order to minimize the perturbations produced by the circumstellar environment on the spectral photospheric signatures. This is one of the first attempts at determining stellar masses and ages by simultaneously using model atmospheres and evolutionary tracks, both calculated for rotating objects. The stellar ages (τ) normalized to the respective inferred time that each rotating star can spend in the main sequence phase ($\tau_{\rm MS}$) reveal a mass-dependent trend. This trend show that: a) there are Be stars spread over the whole interval $0 \lesssim \tau/\tau_{\rm MS} \lesssim 1$ of the main sequence evolutionary phase; b) the distribution of points in the $(\tau/\tau_{\rm MS}, M/M_{\odot})$ diagram indicates that in massive stars ($M \gtrsim 12\,M_{\odot}$) the Be phenomenon is present at smaller $\tau/\tau_{\rm MS}$ age ratios than for less massive stars ($M \lesssim 12\,M_{\odot}$). This distribution can be due to: *i*) higher mass-loss rates in massive objects, which can act to reduce the surface fast rotation; *ii*) circulation time scales to transport angular momentum from the core to the surface, which are longer the lower the stellar mass.

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The Evolutionary Status of Be Stars: Results from a Photometric Study of Southern Open Clusters

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Be stars are a class of rapidly rotating B stars with circumstellar disks that cause Balmer and other line emission. There are three possible reasons for the rapid rotation of Be stars: they

may have been born as rapid rotators, spun up by binary mass transfer, or spun up during the main-sequence (MS) evolution of B stars. To test the various formation scenarios, we have conducted a photometric survey of 55 open clusters in the southern sky. Of these, five clusters are probably not physically associated groups and our results for two other clusters are not reliable, but we identify 52 definite Be stars and an additional 129 Be candidates in the remaining clusters. We use our results to examine the age and evolutionary dependence of the Be phenomenon. We find an overall increase in the fraction of Be stars with age until 100 Myr, and Be stars are most common among the brightest, most massive B-type stars above the zero-age MS (ZAMS). We show that a spin-up phase at the terminal-age MS (TAMS) cannot produce the observed distribution of Be stars, but up to 73% of the Be stars detected may have been spun-up by binary mass transfer. Most of the remaining Be stars were likely rapid rotators at birth.

Previous studies have suggested that low metallicity and high cluster density may also favor Be star formation. Our results indicate a possible increase in the fraction of Be stars with increasing cluster distance from the Galactic center (in environments of decreasing metallicity). However, the trend is not significant and could be ruled out due to the intrinsic scatter in our data. We also find no relationship between the fraction of Be stars and cluster density.

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Kappa-mechanism excitation of retrograde mixed modes in rotating B-type stars

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I examine the stability of retrograde mixed modes in rotating B-type stars. These modes can be regarded as a hybridization between the Rossby modes that arise from conservation of vorticity, and the Poincaré modes that are gravity waves modified by the Coriolis force. Using a non-adiabatic pulsation code based around the traditional approximation, I find that the modes are unstable in mid- to late-B type stars, due to the same iron-bump opacity mechanism usually associated with SPB and β Cep stars. At one half of the critical rotation rate, the instability for $m = 1 \ldots 4$ modes spans the spectral types B4 to A0. Inertial-frame periods of the unstable modes range from 100 days down to a fraction of a day, while normalized growth rates can reach in excess of 10^{-5}.

I discuss the relevance of these findings to the mass-loss mechanism of Be stars, and to the pulsation of the putative Maia class of variable star. I also outline some of the questions raised by this discovery of a wholly-new class of pulsational instability in early-type stars.

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A rigidly rotating magnetosphere model for circumstellar emission from magnetic OB stars

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We present a semi-analytical approach for modelling circumstellar emission from rotating

hot stars with a strong dipole magnetic field tilted at an arbitrary angle to the rotation axis. By assuming the rigid-field limit in which material driven (e.g. in a wind outflow) from the star is forced to remain in strict rigid-body corotation, we are able to solve for the effective centrifugal-plus-gravitational potential along each field line, and thereby identify the location of potential minima where material is prone to accumulate. Applying basic scalings for the surface mass flux of a radiatively driven stellar wind, we calculate the circumstellar density distribution that obtains once ejected plasma settles into hydrostatic stratification along field lines. The resulting accumulation surface resembles a rigidly rotating, warped disc, tilted such that its average surface normal lies between the rotation and magnetic axes. Using a simple model of the plasma emissivity, we calculate time-resolved synthetic line spectra for the disc. Initial comparisons show an encouraging level of correspondence with the observed rotational phase variations of Balmer-line emission profiles from magnetic Bp stars such as σ Ori E.

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The rigidly rotating magnetosphere of σ Ori E

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We attempt to characterize the observed variability of the magnetic helium-strong star σ Ori E in terms of a recently developed rigidly rotating magnetosphere model. This model predicts the accumulation of circumstellar plasma in two co-rotating clouds, situated in magnetohydrostatic equilibrium at the intersection between magnetic and rotational equators. We find that the model can reproduce well the periodic modulations observed in the star's light curve, Hα emission-line profile, and longitudinal field strength, confirming that it furnishes an essentially correct, quantitative description of the star's magnetically controlled circumstellar environment.

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VLTI/AMBER and VLTI/MIDI spectro-interferometric observations of the B[e] supergiant CPD−57 2874

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We present the first high spatial and spectral observations of the circumstellar envelope (CSE) of a B[e] supergiant (CPD−57 2874), performed with the Very Large Telescope Interferometer (VLTI). Spectra, visibilities, and closure phase, were obtained using the beam-combiner instruments AMBER (near-IR interferometry with three 8.3 m Unit Telescopes or UTs) and MIDI (mid-IR interferometry with two UTs). The interferometric observations of the CSE are well fitted by an elliptical Gaussian model with FWHM diameters varying linearly with wavelength. Typical diameters measured are $\simeq 1.8 \times 3.4$ mas or $\simeq 4.5 \times 8.5$ AU (adopting a distance of 2.5 kpc) at 2.2 μm , and $\simeq 12 \times 15$ mas or $\simeq 30 \times 38$ AU at 12 μm . The size of the region emitting the Brγ flux is $\simeq 2.8 \times 5.2$ mas or $\simeq 7.0 \times 13.0$ AU. The major-axis position angle of the elongated CSE in the mid-IR ($\simeq 144°$) agrees well with previous polarimetric data, hinting that the hot-dust emission originates in a disk-like structure. In addition to the interferometric observations we also present new optical ($UBVR_cI_c$) and near-IR ($JHKL$) broadband photometric observations of CPD−57 2874. Our spectro-interferometric VLTI observations and data analysis support the non-spherical CSE paradigm for B[e] supergiants.

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New Photometric Observations of σ Ori E

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We present new *UBVRI* observations of the magnetic Bp star σ Ori E. The basic features of the star's lightcurve have not changed since the previous monitoring by Hesser et al. (1977), indicating that the star's magnetosphere has remained stable over the past three decades. Interestingly, we find a rotation period that is slightly longer than in the Hesser et al. (1977) analysis, suggesting possible spindown of the star.

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Kappa-Mechanism Excitation of Retrograde Mixed Modes in B-Type Stars

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The stability of retrograde mixed modes in rotating B-type stars is investigated. It is found that these modes are susceptible to κ-mechanism excitation, due to the iron opacity bump at $\log T \approx 5.3$. The findings are discussed in the context of the pulsation of SPB and Be stars.

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σ Ori E: The Archetypal Rigidly Rotating Magnetosphere

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I review the basic concepts of the Rigidly Rotating Magnetosphere model for the circumstellar plasma distribution around the helium-strong star σ Ori E. I demonstrate that the model can furnish a good fit to the photometric, spectroscopic and magnetic variability exhibited by this star, and argue that the variability of other helium-strong stars may be amenable to a similar interpretation.

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A study of the B and Be star population in the field of the LMC open cluster NGC 2004 with VLT-FLAMES

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Observations of hot stars belonging to the young cluster LMC-NGC 2004 and its surrounding region have been obtained with the VLT-GIRAFFE facilities in MEDUSA mode. 25 Be stars were discovered; the proportion of Be stars compared to B-type stars is found to be of the same order in the LMC and in the Galaxy fields. 23 hot stars were discovered as spectroscopic binaries (SB1 and SB2), 5 of these are found to be eclipsing systems from the MACHO database, with periods of a few days. About 75% of the spectra in our sample are polluted by hydrogen (Hα and Hγ), S II and N II nebular lines. These lines are typical of H II regions. They could be associated with patchy nebulosities with a bi-modal distribution in radial velocity, with higher values (+335 km s^{-1}) preferentially seen inside the southern part of the known bubble LMC4 observed in H I at 21 cm.

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The Remarkable Be Star HD 110432 (BZ Cru)

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HD 110432 is a hard, variable X-ray source with local absorption due to an extensive circumstellar disk. From time-serial echelle data obtained over two weeks during 2005 January and February, we have discovered several remarkable characteristics in the star's optical spectrum. The line profiles show rapid variations on some nights which can most likely be attributed to irregularly occurring and short-lived *migrating subfeatures.* Such features have been found in spectra of γ Cas and AB Dor, two stars hosting circumstellar clouds that corotate over their surfaces. The star's optical spectrum also exhibits a number of mainly Fe II and He I emission features with double-lobed profiles typical of an optically thin circumstellar disk viewed nearly edge-on. Using spectral synthesis techniques for the January data, we find that its temperature and column density are close to 9,800 K and roughly 3×10^{22} cm^{-2}. Its projected disk size covers a remarkably large 100 stellar areas, and the emitting volume resides at a surprisingly large distance of 1 A.U. Surprisingly, we also find that the absorption wings of the strongest optical and UV lines in the spectrum extend to at least ±1000 km s^{-1}, even though the rotational velocity is 300–400 km s^{-1}. We are unable to find a satisfactory explanation for these extreme line broadenings. Otherwise, HD 110432 and γ Cas share similarly peculiar X-ray and optical characteristics. These include a high X-ray temperature, erratic X-ray variability on timescales of a few hours, optical metallic emission lines, and submigrating features in optical line profiles. Because of these similarities, we suggest that HD 110432 is a member of a select new class of "γ Cas analogs."

2006 ApJ, 640, 491

α Eri: rotational distortion, stellar and circumstellar activity

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We explore the geometrical distortion and the stellar and circumstellar activity of α Eri (HD 10144), the brightest Be star in the sky. We present a thorough discussion of the fundamental parameters of the object for an independent determination of its rotational distortion. We used stellar atmosphere models and evolutionary tracks calculated for fast rotating early-type stars. If the star is a rigid rotator, its angular velocity rate is $\Omega/\Omega_c \simeq 0.8$, so that its rotational distortion is smaller than the one inferred from recent interferometric measurements. We then discuss the stellar surface activity using high resolution and high S/N spectroscopic observations of He I and Mg II lines, which concern a period of Hα line emission decline. The variations in the He I lines are interpreted as due to non-radial pulsations. Time series analysis of variations was performed with the CLEANEST algorithm, which enabled us to detect the following frequencies: 0.49, 0.76, 1.27 and 1.72 c/d and pulsation degrees $\ell \sim (3-4)$ for $\nu = 0.76$ c/d; $\ell \sim (2-3)$ for $\nu = 1.27$ c/d and $\ell \sim (3-4)$ for $\nu = 1.72$ c/d. The study of the absolute deviation of the He I λ6678 Å spectral line

revealed mass ejection between 1997 and 1998. We conclude that the lowest frequency found, $\nu = 0.49$ c/d, is due to the circumstellar environment, which is present even at epochs of low emission in the wings of He I λ6678 Å and Mg II λ4481 Å line profiles, as well as during nearly normal aspects of the Hα line. This suggests that there may be matter around the star affecting some spectral regions, even though the object displays a B-normal like phase. The long-term changes of the Hα line emission in α Eri are studied. We pay much attention to the Hα line emission at the epoch of interferometric observations. The Hα line emission is modeled and interpreted in terms of varying structures of the circumstellar disc. We conclude that during the epoch of interferometric measurements there was enough circumstellar matter near the star to produce $\lambda 2.2\mu$m flux excess, which could account for the overestimated stellar equatorial angular diameter. From the study of the latest B$\rightleftharpoons$Be phase transition of α Eri we concluded that the Hα line emission formation regions underwent changes so that: a) the low Hα emission phases are characterized by extended emission zones in the circumstellar disc and a steep outward matter density decline; b) during the strong Hα emission phases the emitting regions are less extended and have a constant density distribution. The long-term variations of the Hα line in α Eri seem to have a 14-15 year cyclic B$\rightleftharpoons$Be phase transition. The disc formation time scales, interpreted as the periods during which the Hα line emission increases from zero to its maximum, agree with the viscous decretion model. On the other hand, the time required for the disc dissipation ranges from 6 to 12 years which questions the viscous disc model.

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Centrifugal Breakout of Magnetically Confined Line-Driven Stellar Winds

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We present 2D MHD simulations of the radiatively driven outflow from a rotating hot star with a dipole magnetic field aligned with the star's rotation axis. We focus primarily on a model with moderately rapid rotation (half the critical value), and also a large magnetic confinement parameter, $\eta_* \equiv B_*^2 R_*^2/\dot{M} V_\infty = 600$. The magnetic field channels and torques the wind outflow into an equatorial, rigidly rotating disk extending from near the Kepler corotation radius outwards. Even with fine-tuning at lower magnetic confinement, none of the MHD models produce a stable Keplerian disk. Instead, material below the Kepler radius falls back on to the stellar surface, while the strong centrifugal force on material beyond the corotation escape radius stretches the magnetic loops outwards, leading to episodic breakout of mass when the field reconnects. The associated dissipation of magnetic energy heats material to temperatures of nearly 10^8 K, high enough to emit hard (several keV) X-rays. Such *centrifugal mass ejection* represents a novel mechanism for driving magnetic reconnection, and seems a very promising basis for modeling X-ray flares recently observed in rotating magnetic Bp stars like σ Ori E.

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Be/X-ray binaries and candidates

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We present a compilative catalogue of Be/X-ray binaries and candidates in the Galaxy and in the Large and Small Magellanic Clouds. This catalogue contains 130 sources and provides information on names and spectral types of optical components, distances, on spin characteristics of neutron stars and on orbital and X-ray properties of binary systems. We give brief comments on each object and provide necessary references to original data.

2005 A&AT, 24, 151

Effects of metallicity, star-formation conditions, and evolution in B and Be stars. I. Large Magellanic Cloud, field of NGC 2004

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To statistically study the effects of the metallicity, star-formation conditions, and evolution on the behaviour of massive stars and, more particularly, of B and Be stars, we observed large samples of stars in the Magellanic Clouds for the first time. In this article we present the first part of this study. Spectroscopic observations of hot stars belonging to the young cluster LMC-NGC 2004 and its surrounding region were carried out with the VLT-GIRAFFE facilities in MEDUSA mode. We determined the fundamental parameters ($T_{\rm eff}$, $\log g$, $vsini$, and radial velocity) for all B and Be stars in the sample thanks to a code developed in our group. The effect of fast rotation (stellar flattening and gravitational darkening) are taken into account in this study. We also determined the age of observed clusters. We then compared the mean $v \sin i$ obtained for field and cluster B and Be stars in the Large Magellanic Cloud (LMC) with the ones in the Milky Way (MW). We find, in particular, that Be stars rotate faster in the LMC than in the MW, in the field as well as in clusters. We discuss the relations between $v \sin i$, metallicity, star-formation conditions, and stellar evolution by comparing the LMC with the MW. We conclude that Be stars began their main sequence life with an initial rotational velocity higher than the one for B stars. It is probable that only part of the B stars, those with a sufficient initial rotational velocity, can become Be stars. This result may explain the differences in the proportion of Be stars in clusters with similar ages.

2006 A&A, 452, 273

Rotational and Cyclical Variability in γ Cas

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γ Cas is an unusual classical Be star for which the optical-band and hard X-ray fluxes vary on a variety of timescales. We report results of a 9 year monitoring effort on this star with a robotic ground-based (APT) telescope in the B, V filter system as well as simultaneous observations in 2004 November with this instrument and the *Rossi X-ray Timing Explorer (RXTE)* satellite. Our observations disclosed no correlated optical response to the rapid X-ray flares in this star, nor did the star show any sustained flux changes any time during two monitored nights in either wavelength regime. Consistent with an earlier study by Robinson et al., optical light curves obtained in our new APT program revealed that γ Cas undergoes $\sim$3%-amplitude cycles with lengths of 50–91 days. Our observations in 2004 showed a similar optical cycle. Over the nine days we monitored the star with the *RXTE*, the X-ray flux varied in phase with its optical cycle and with an amplitude predicted from the data in Robinson et al. In general, the amplitude of the V magnitude cycles are 30–40% larger than the corresponding B amplitude, suggesting that the production site of the cycles is circumstellar. The cycle lengths constantly change and can damp or grow on timescales as short as 13 days. We have also discovered a coherent period of 1.21581$\pm$0.00004 days in all our data, which appears consistent only with rotation. The full amplitude of this variation is 0.0060 in both filters, and, surprisingly, its waveform is almost sawtooth in shape. This variation is likely to originate on the star's surface. This circumstance hints at the existence of a strong magnetic field with a complex topology and a possible heterogeneous surface distribution of metals.

2006 ApJ, 647, 1375

Remarks on statistical errors in equivalent widths

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Equivalent width measurements for rapid line variability in atomic spectral lines are degraded by increasing error bars with shorter exposure times. We derive an expression for the error of the line equivalent width $\sigma(W_\lambda)$ with respect to pure photon noise statistics and provide a correction value for previous calculations.

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The Role of Evolutionary Age and Metallicity in the Formation of Classical Be Circumstellar Disks. I. New Candidate Be Stars in the LMC, SMC, and Milky Way

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We present B, V, R, and Hα photometry of 8 clusters in the Small Magellanic Cloud, 5 in the Large Magellanic Cloud, and 3 Galactic clusters, and use 2 color diagrams (2-CDs) to identify candidate Be star populations in these clusters. We find evidence that the Be

phenomenon is enhanced in low metallicity environments, based on the observed fractional early-type candidate Be star content of clusters of age 10-25 Myr. Numerous candidate Be stars of spectral types B0 to B5 were identified in clusters of age 5-8 Myr, challenging the suggestion of Fabregat & Torrejon (2000) that classical Be stars should only be found in clusters at least 10 Myr old. These results suggest that a significant number of B-type stars must emerge onto the zero-age-main-sequence as rapid rotators. We also detect an enhancement in the fractional content of early-type candidate Be stars in clusters of age 10-25 Myr, suggesting that the Be phenomenon does become more prevalent with evolutionary age. We briefly discuss the mechanisms which might contribute to such an evolutionary effect. A discussion of the limitations of utilizing the 2-CD technique to investigate the role evolutionary age and/or metallicity play in the development of the Be phenomenon is offered, and we provide evidence that other B-type objects of very different nature, such as candidate Herbig Ae/Be stars may contaminate the claimed detections of "Be stars" via 2-CDs.

2006 ApJ, 652, 458

Constraining Disk Parameters of Be Stars Using Narrowband Hα Interferometry with the Navy Prototype Optical Interferometer

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Interferometric observations of two well-known Be stars, γ Cas and ϕ Per, were collected and analyzed to determine the spatial characteristics of their circumstellar regions. The observations were obtained using the Navy Prototype Optical Interferometer equipped with custom-made narrowband filters. The filters isolate the Hα emission line from the nearby continuum radiation, which results in an increased contrast between the interferometric signature due to the Hα-emitting circumstellar region and the central star. Because the narrowband filters do not significantly attenuate the continuum radiation at wavelengths 50 nm or more away from the line, the interferometric signal in the Hα channel is calibrated with respect to the continuum channels. The observations used in this study represent the highest spatial resolution measurements of the Hα-emitting regions of Be stars obtained to date. These observations allow us to demonstrate for the first time that the intensity distribution in the circumstellar region of a Be star cannot be represented by uniform disk or ringlike structures, whereas a Gaussian intensity distribution appears to be fully consistent with our observations.

2006 AJ, 131, 2710

Variations of the He II λ1640 Line in B0e–B2.5e Stars

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Using the *International Ultraviolet Explorer* data archive, we have examined the *SWP* echellograms of 74 B0–B2.5e stars for statistically significant fluctuations in the He II ("Hα") λ1640 line profile. In this sample we found that the He II line is occasionally variable in 10 stars over short to long timescales. The He II-variable stars discovered are λ Eri, ω Ori, μ Cen, 6 Cep, HD 67536, ψ^1 Ori, η Cen, π Aqr, 2 Vul, and 19 Mon. The most frequent two types of variability are an extended blue wing absorption and a weakening of the line along the profile. Other types of variability are a weak emission in the red wing and occasionally a narrow emission feature. In the overwhelming number of cases, the C IV resonance doublet exhibits a similar response; rarely, it can exhibit a variation in the opposite sense. Similar responses are also often seen in the Si IV doublet, and occasionally even the Si III λ1206 line. We interpret the weakenings of He II and of high-velocity absorptions of C IV to localized decreases in the photospheric temperature, although this may not be a unique interpretation. We discuss the variable blue wing absorptions and red wing emissions in terms of changes in the velocity law and mass flux carried by the wind. In the latter case, recent experimental models by Venero, Cidale, & Ringuelet require that during such events the wind must be heated by 35,000 K at some distance from the star.

2006 A&A, 459, 215

Be stars: one ring to rule them all?

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Aims. We report the theoretical spectral energy distributions (SEDs), Brγ line profiles, and visibilities for two scenarios that can explain the disk dissipation of active hot stars and account for the transition from the Be to the B spectroscopic phase.
Methods. We use the SIMECA code to investigate two scenarios, the first one where the disk is formed by successive outbursts of the central star. A low-density region is developing above the star and slowly grows outward and forms a ring-like structure that will gradually excavate the disk. The second one has a slowly decreasing mass loss due for instance, to a decrease in the radiative force through an opacity change at the base of the photosphere, and may also be responsible for the vanishing of the circumstellar disk.
Results. We find that a clear signature of the disk dissipation following the ring scenario will be the disappearance of the high velocity tails in the emission lines and a nearly constant peak separation. Moreover, we found that, following the ring-like scenario, the visibilities must show an increasing second lobe, an increase in the value of the first zero, and assuming an unresolved central star, a first zero of the visibility curves that appends at shorter baselines as far as the disk has been excavated. We propose to use the AMBER instrument on the VLTI to probe whether the ring scenario is the one to rule the Be phenomenon.

2006 A&A, 455, 953

Estimating Be Star Disk Radii using Hα Emission Equivalent Widths

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We present numerical models of the circumstellar disks of Be stars, and we describe the resulting synthetic Hα emission lines and maps of the wavelength-integrated emission flux projected onto the sky. We demonstrate that there are monotonic relationships between the emission line equivalent width and the ratio of the angular half-width at half maximum of the projected disk major axis to the radius of the star. These relationships depend mainly upon the temperatures of the disk and star, the inclination of the disk normal to the line of sight, and the adopted outer boundary for the disk radius. We show that the predicted Hα disk radii are consistent with those observed directly through long baseline interferometry of nearby Be stars (especially once allowance is made for disk truncation in binaries and for dilution of the observed Hα equivalent width by continuum disk flux in the V-band).

2006 ApJL, 651, 53

Effects of metallicity, star-formation conditions, and evolution in B and Be stars. II. Small Magellanic Cloud, field of NGC 330

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We search for effects of metallicity on B and Be stars in the Small and Large Magellanic Clouds (SMC and LMC) and in the Milky Way (MW). We extend our previous analysis of B and Be stars populations in the LMC to the SMC. The rotational velocities of massive stars and the evolutionary status of Be stars are examined with respect to their environments. Spectroscopic observations of hot stars belonging to the young cluster SMC-NGC 330 and its surrounding region have been obtained with the VLT-GIRAFFE facilities in MEDUSA mode. We determine fundamental parameters for B and Be stars with the GIRFIT code, taking into account the effect of fast rotation, and the age of observed clusters. We compare the mean *vsini* obtained by spectral type- and mass-selection for field and cluster B and Be stars in the SMC with the one in the LMC and MW. We find that (i) B and Be stars rotate faster in the SMC than in the LMC, and in the LMC than in the MW; (ii) at a given metallicity, Be stars begin their main sequence life with a higher initial rotational velocity than B stars. Consequently, only a fraction of B stars that reach the ZAMS with a sufficiently high initial rotational velocity can become Be stars; (iii) the distributions of initial rotational velocities at the ZAMS for Be stars in the SMC, LMC and MW are mass- and metallicity-dependent; (iv) the angular velocities of B and Be stars are higher in the

SMC than in the LMC and MW; (v) in the SMC and LMC, massive Be stars appear in the second part of the main sequence, contrary to massive Be stars in the MW.

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CHARA Array K'-band Measurements of the Angular Dimensions of Be Star Disks

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We present the first K'-band, long-baseline interferometric observations of the northern Be stars γ Cas, ϕ Per, ζ Tau, and κ Dra. The measurements were made with multiple telescope pairs of the CHARA Array interferometer, and in every case the observations indicate that the circumstellar disks of the targets are resolved. We fit the interferometric visibilities with predictions from a simple disk model that assumes an isothermal gas in Keplerian rotation. We derive fits of the four model parameters (disk base density, radial density exponent, disk normal inclination, and position angle) for each of the targets. The resulting densities are in broad agreement with prior studies of the IR excess flux and the resulting orientations generally agree with those from interferometric Hα and continuum polarimetric observations. We find that the angular size of the K' disk emission is smaller than that determined for the Hα emission, and we argue that the difference is the result of a larger Hα opacity and the relatively larger neutral hydrogen fraction with increasing disk radius. All the targets are known binaries with faint companions, and we find that companions appear to influence the interferometric visibilities in the cases of ϕ Per and κ Dra. We also present contemporaneous observations of the Hα, Hγ, and Brγ emission lines. Synthetic model profiles of these lines that are based on the same disk inclination and radial density exponent as derived from the CHARA Array observations match the observed emission line strength if the disk base density is reduced by ≈ 1.7 dex.

2007 ApJ, 654, 527

On the Hα emission from the β Cephei system

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Be stars, which are characterised by intermittent emission in their hydrogen lines, are known to be fast rotators. This fast rotation is a requirement for the formation of a Keplerian disk, which in turn gives rise to the emission. However, the pulsating, magnetic B1IV star β Cephei is a very slow rotator that still shows Hα emission episodes like in other Be stars, contradicting current theories. We investigate the hypothesis that the Hα emission stems from the spectroscopically unresolved companion of β Cep. Spectra of the two unresolved components have been separated in the 6350–6850Å range with spectro-astrometric techniques, using 11 longslit spectra obtained with ALFOSC at the Nordic Optical Telescope, La Palma. We find that the Hα emission is not related to the primary in β Cep, but is due to its 3.4 magnitudes fainter companion. This companion has been resolved by speckle techniques, but it remains unresolved by traditional spectroscopy. The emission extends from about -400 to $+400$ km s^{-1}. The companion star in its 90-year orbit is likely to be a classical Be star with a spectral type around B6-8. By identifying its Be-star companion as the origin of the Hα emission behaviour, the enigma behind the Be status of the slow rotator β Cep has been resolved.

2006 A&A, 459, 21

Properties of the δ Scorpii Circumstellar Disk from Continuum Modeling

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We present optical *WBVR* and infrared *JHKL* photometric observations of the Be binary

system δ Sco, obtained in 2000–2005, mid-infrared (10 and 18 μm) photometry and optical ($\lambda\lambda$ 3200–10500 Å) spectropolarimetry obtained in 2001. Our optical photometry confirms the results of a frequent visual monitoring being done by amateurs. The 2001 spectral energy distribution and polarization are successfully modeled with a three-dimensional non-LTE Monte Carlo code which calculates self-consistently the hydrogen level populations, electron temperature, and gas density for hot star disks. Our disk model is hydrostatically supported in the vertical direction and radially controlled by viscosity. Such a disk model has, essentially, only two free parameters, viz., the equatorial mass loss rate and the disk outer radius, if one assumes a prescription for the viscosity. We find that the primary companion is surrounded by a small (7 $R_\star$), geometrically-thin disk, which is highly non-isothermal and fully ionized. Our model requires an average equatorial mass loss rate of $1.5 \times 10^{-9} M_\odot$ yr^{-1} to successfully explain the observations. In 2005, we detected a significant simultaneous decrease in the object's optical and near-infrared brightness which is associated with a continuous rise in the hydrogen line equivalent widths. We discuss possible causes for this unusual phenomenon, which is difficult to explain in view of current models of Be star disks.

2006 ApJ, 652, 1617

Toward Mapping the Detailed Density Structure of Classical Be Circumstellar Disks

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The first results from a near-contemporaneous optical and infrared spectroscopic observing program designed to probe the detailed density structure of classical Be circumstellar disks are presented. We report the discovery of asymmetrical infrared emission lines of He I, O I, Fe II, and the Brackett, Paschen, and Pfund series lines of H I which exhibit an opposite V/R orientation (V > R) to that observed for the optical Balmer Hα line (V < R) in the classical Be star ζ Tau. We interpret these data as evidence that the density wave which characterizes ζ Tau's disk has a significantly different average azimuthal morphology in the inner disk region as compared to the outer disk region. A follow-up multi-wavelength observational campaign to trace the temporal evolution of these line profile morphologies, along with detailed theoretical modeling, is suggested to test this hypothesis.

2007 ApJL, 656, 21

Joint Hα and X-Ray Observations of Massive X-Ray Binaries. III. The Be X-ray Binaries HDE 245770 = A 0535+26 and X Persei

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We present results from an Hα monitoring campaign of the Be X-ray binary systems HDE 245770 = A 0535+26 and X Per. We use the Hα equivalent widths together with adopted values of the Be star effective temperature, disk inclination, and disk outer boundary to determine the half-maximum emission radius of the disk as a function of time. The observations of HDE 245770 document the rapid spectral variability that apparently accompanied the regeneration of a new circumstellar disk. This disk grew rapidly during the years 1998 – 2000, but then slowed in growth in subsequent years. The outer disk radius is probably truncated by resonances between the disk gas and neutron star orbital periods. Two recent X-ray outbursts appear to coincide with the largest disk half-maximum emission radius attained over the last decade. Our observations of X Per indicate that its circumstellar disk has recently grown to near record proportions, and concurrently the system has dramatically increased in X-ray flux, presumably the result of enhanced mass accretion from the disk. We find that the Hα half-maximum emission radius of the disk surrounding X Per reached a size about six times larger than the stellar radius, a value, however, that is well below the minimum separation between the Be star and neutron star. We suggest that spiral arms excited by tidal interaction at periastron may help lift disk gas out to radii where accretion by the neutron star companion becomes more effective.

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Variations of the ultraviolet resonance lines of the B2 IV-V star ζ Cassiopeiae

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Recently Neiner et al. reported that the B2 IV-V star ζ Cas contains a weak magnetic

field which varies on the same 5.37 day period found from the modulations of its N V, C IV, and Si IV UV resonance lines. We have studied the time variable properties of the same resonance lines in greater detail to determine the physical characteristics of the magnetospheric structure responsible for them. In our formulation this structure takes the form of an axisymmetric "disk" similar to those around magnetic He-strong Bp stars. This structure corotates with the star, covering greater or lesser amounts of its area during its transit. ζ Cas offers a special case because we observe it from a low inclination and yet its magnetic axis is substantially inclined to the rotation axis. The equivalent width-phase curves show a flat maximum for half the cycle, indicating that the disk is extended out of the plane, extends to the star's surface in the magnetic plane, or both. Synthetic spectra of the line profiles during the maximum and minimum occultation phases can be best reconciled with a disk geometry in which the resonance lines are formed at a closed outer edge and along a thin outer layer. We speculate that observed weak redshifted emission is formed in "auroral caps" located near the magnetic poles of the star. We argue that this results from shocks of stagnated wind material returning to the star and shocking against the outflowing wind.

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6. MEETINGS

- 2005 Jul 10–16
  Workshop on "Stars with the B[e] phenomenon"
  Island of Vlieland, The Netherlands
  http://www.astro.uu.nl/ kraus/b-e-conf/

- 2005 Aug 29–Sep 2
  Active OB-Stars: Laboratories for Stellar & Circumstellar Physics
  Sapporo, Japan
  http://www.kwasan.kyoto-u.ac.jp/be2005/

- 2006 Aug 14–25
  IAU XXVI General Assembly
  Prague, Czech Republic
  http://www.astronomy2006.com/

See http://cadcwww.dao.nrc.ca/meetings/meetings.html for more.

7. LATEX TEMPLATE FOR ABSTRACTS

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\begin{center}{\Large\bf Title
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\centerline{\bf A. Author$^1$ and B. Author$^2$
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             \\ $^2$   Institute Two and Address
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