Cláudia Vilega Rodrigues

Abril/2017

Workshop da DAS

Roteiro

* Atividades de pesquisa

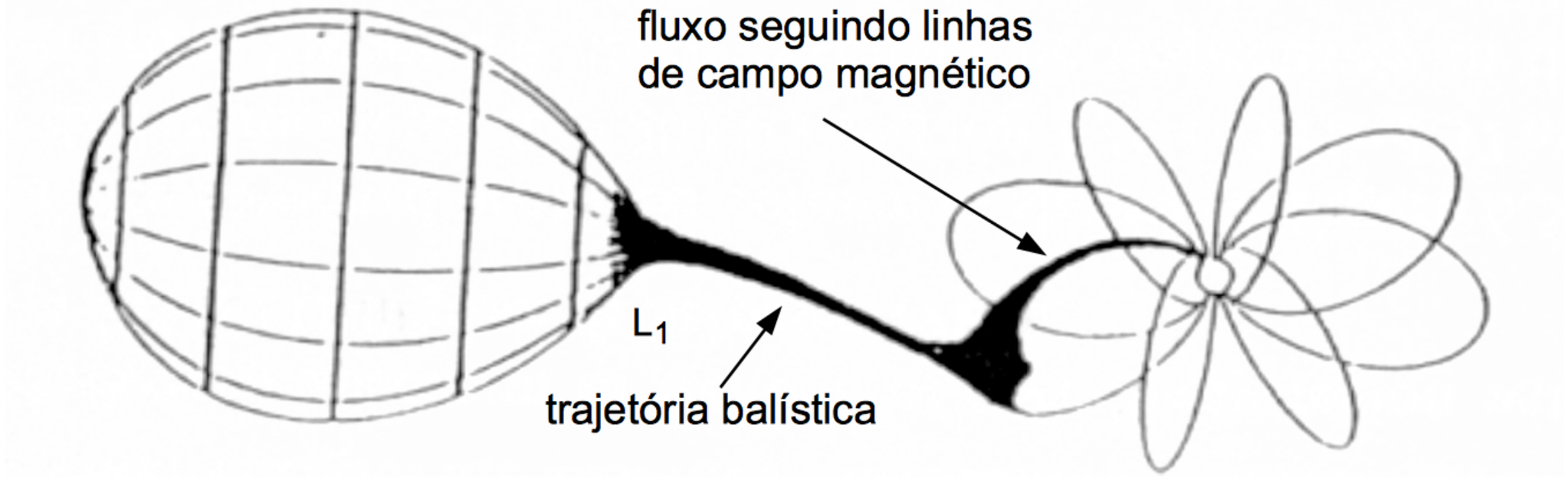
* Atividades de pós-graduação

* Perspectivas 2017

Variáveis cataclísmicas, com ênfase nas magnéticas

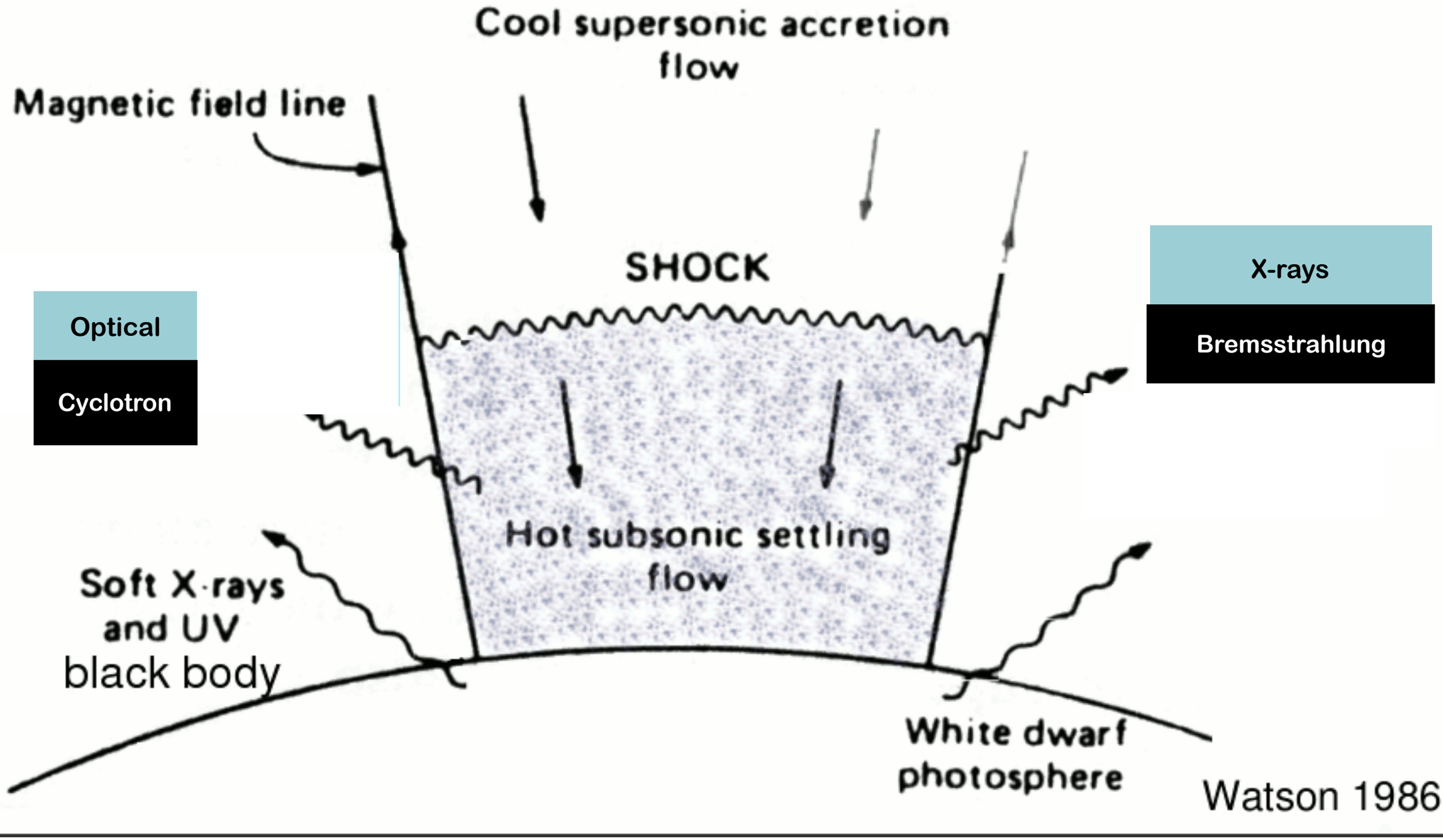
Polares

- Observações: fotometria, polarimetria e espectroscopia
- Modelos ópticos e raios X



Cropper (1990)

Região emissora



Cyclops

Cyclotron Emission of Polars

- Modelos para emissão de polares no óptico e em raios X

AE Aqr

* Estudo da emissão em raios-X de AE Aqr
* Dados do Nustar e Swift
* Consistente com coluna de acreção
* Estamos trabalhando na redução dos espectros em fase

Apresentação em evento
Artigo em preparação

The accretion column of AE Aqr

Claudia V. Rodrigues[1], Karleyne M. G. Silva[2], G. Juan M. Luna[3], Jaziel G. Coelho[1], Isabel J. Lima (INPE), [1], Joaquim E. R. Costa (INPE)[1], and J. Carlos N. de Araujo (INPE)[1]

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[2]Gemini Observatory
[3]Instituto de Astronomía y Física del Espacio, Argentina

AE Aqr is a magnetic cataclysmic variable, whose white dwarf rotates at the very fast rate of 33 s modulating the flux from high energies to optical wavelengths. There are many studies about the origin of its emission, which consider emission from a rotating magnetic field or from an accretion column. Recent observations have not found emission from AE Aqr in gamma rays, putting difficulties for the pulsar-like model. Furthermore, X-ray data can be fit using thermal models. Here we present a successful modeling of AE Aqr X-ray spectra and light curve considering the emission of a magnetic accretion column using the CYCLOPS code. The model takes into consideration the 3D geometry of the system, allowing to properly represent the white-dwarf auto eclipse, the pre-shock column absorption, and the varying density and temperature of a tall accretion column. To our knowledge, we present the first physical modeling of AE Aqr light curve in high energies.

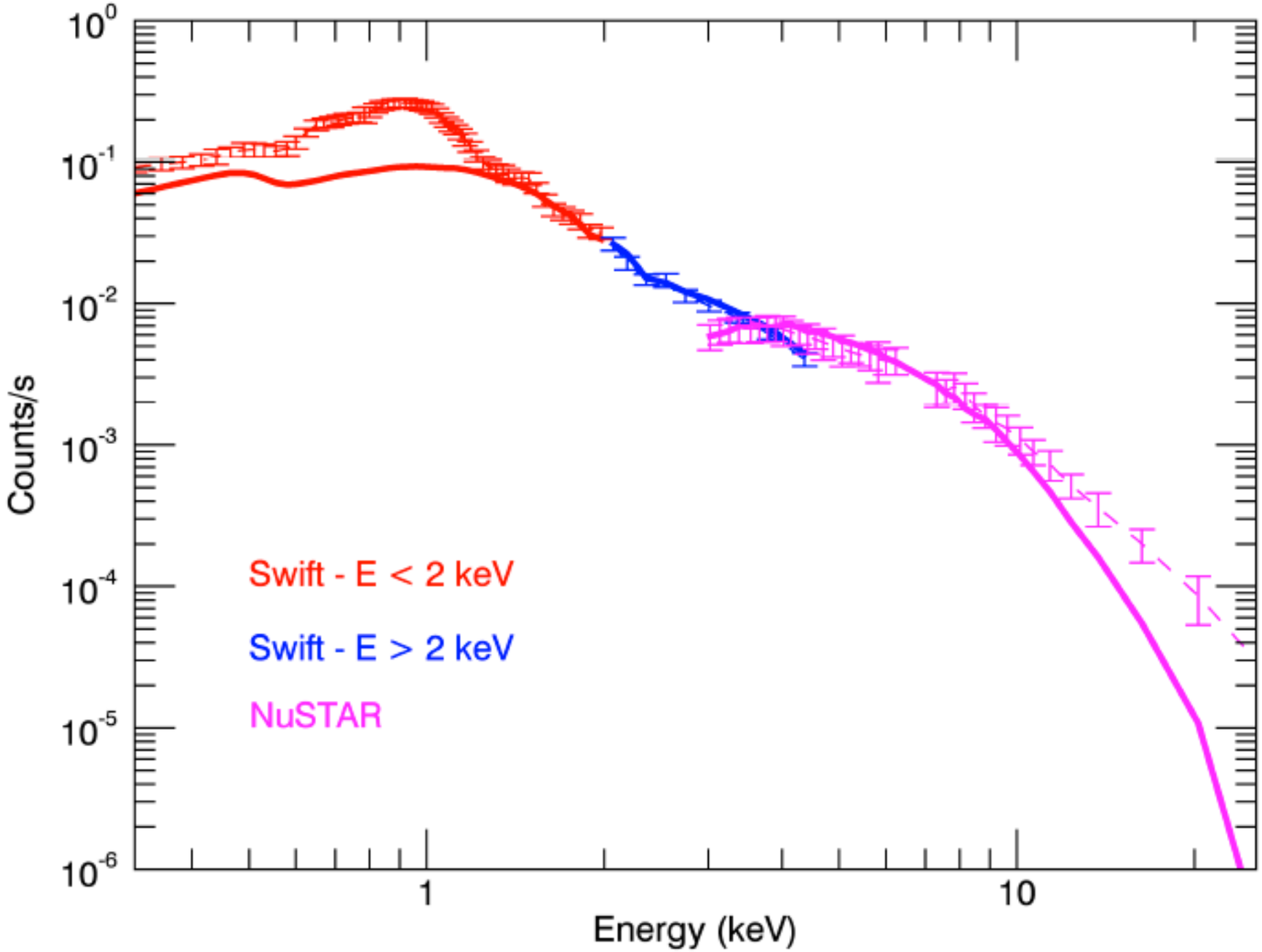

Figure 1: Swift and NuSTAR spectra of AE Aqr (error bars) and the CYCLOPS model for a shock structure having $T_{max} = 4$ keV (solid line).

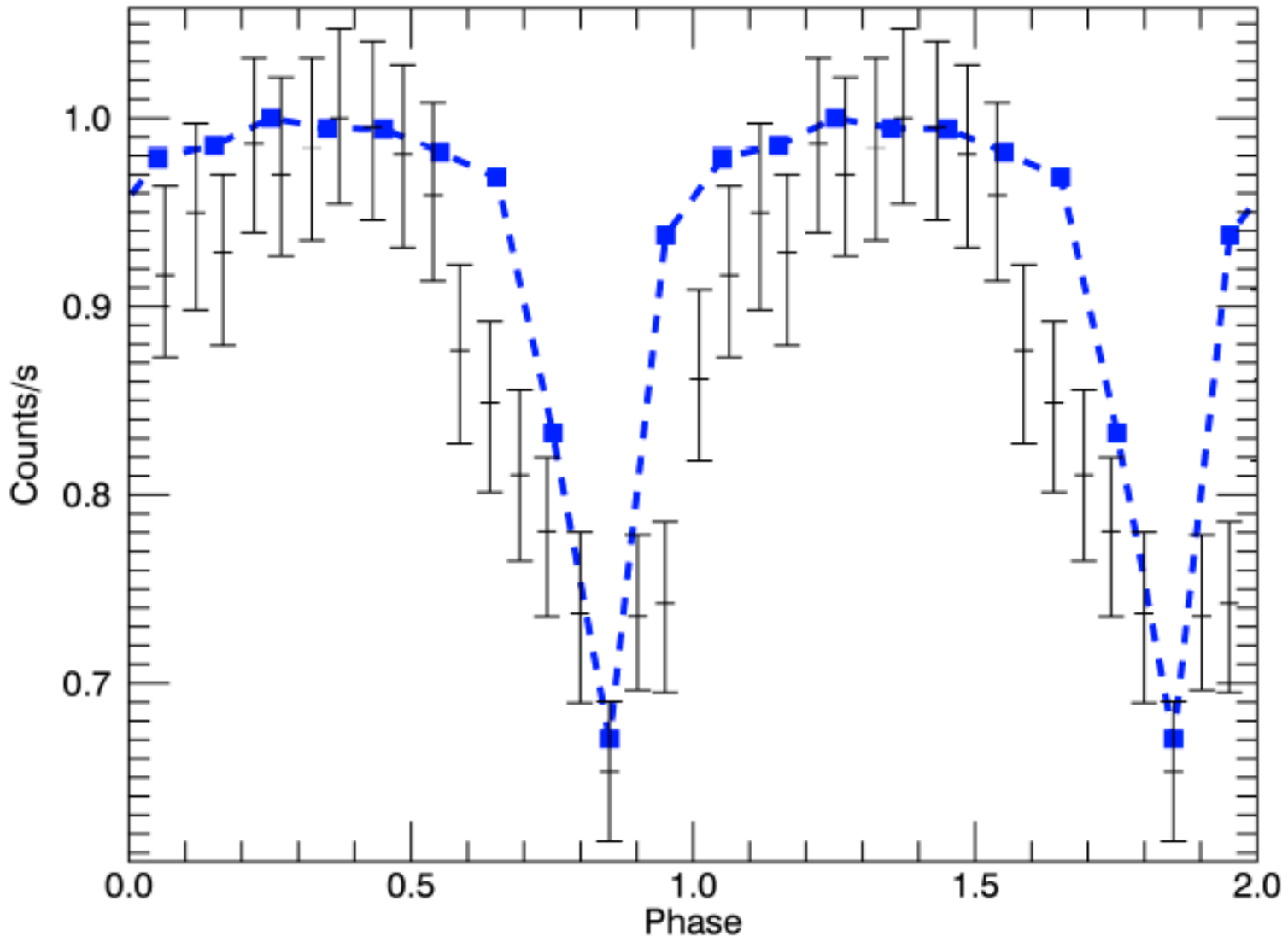

Figure 3: CYCLOPS model to the light curve of AE Aqr from 3 to 20 keV (blue line). The error bars are the data from Kitaguchi et al. (2014).

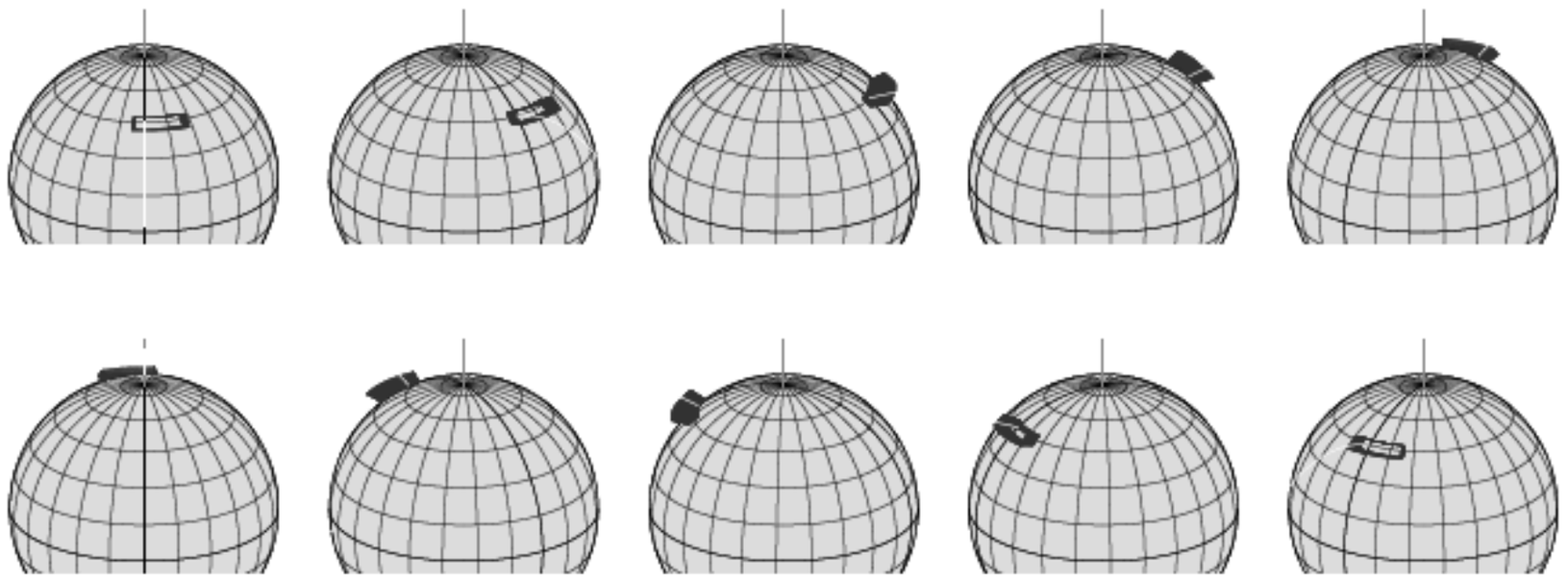

Figure 4: The post shock region of the AE Aqr model seen along the spin cycle of the white dwarf.

The Astronomical Journal, 153:144 (18pp), 2017 April https://doi.org/10.3847/1538-3881/aa610d

Exploratory Spectroscopy of Magnetic Cataclysmic Variables Candidates and Other Variable Objects*

A. S. Oliveira[1], C. V. Rodrigues[2], D. Cieslinski[2], F. J. Jablonski[2], K. M. G. Silva[3], L. A. Almeida[4], A. Rodríguez-Ardila[5], and M. S. Palhares[1]
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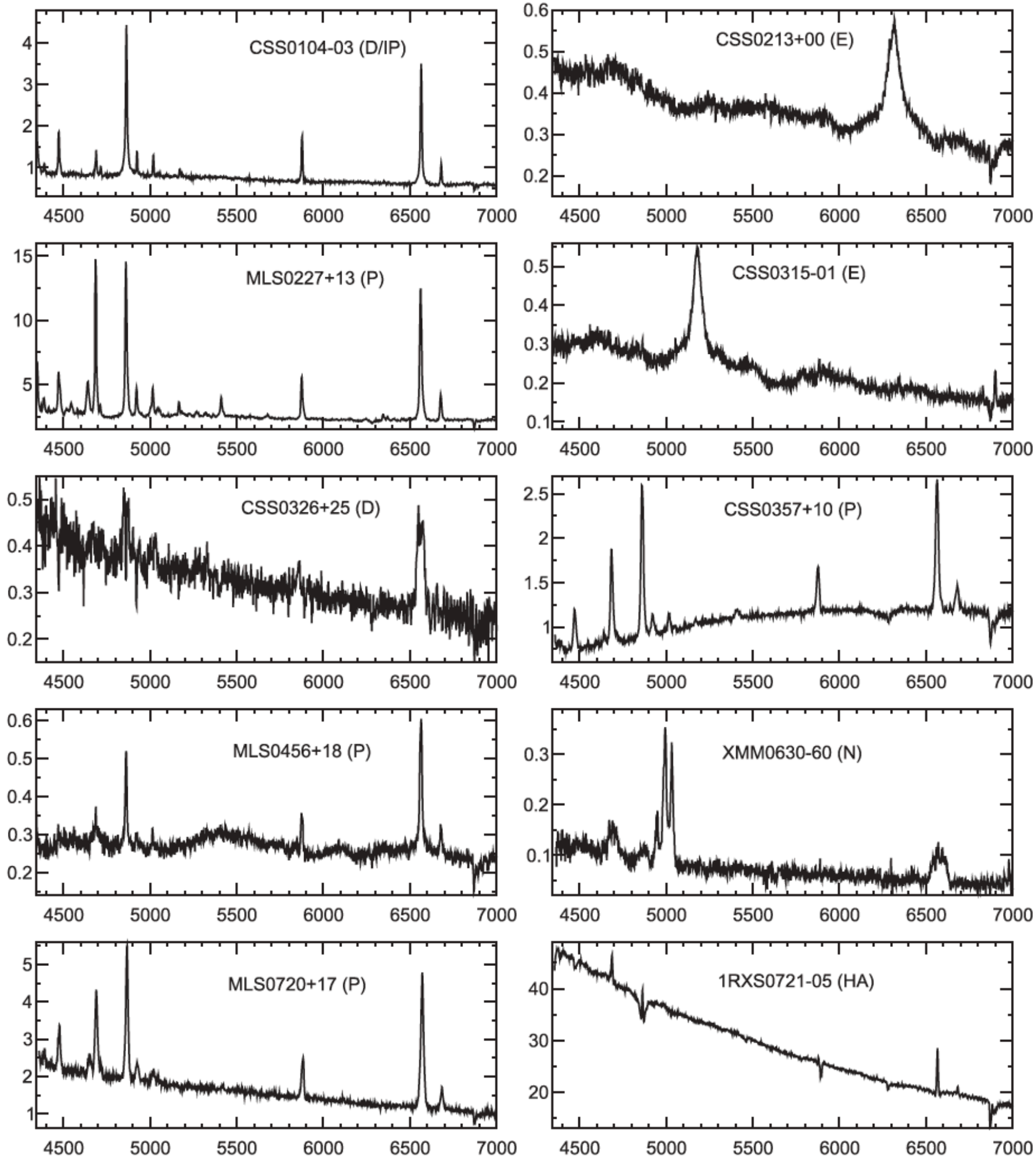
Abstract

The increasing number of synoptic surveys made by small robotic telescopes, such as the photometric Catalina Real-Time Transient Survey (CRTS), provides a unique opportunity to discover variable sources and improves the statistical samples of such classes of objects. Our goal is the discovery of magnetic Cataclysmic Variables (mCVs). These are rare objects that probe interesting accretion scenarios controlled by the white-dwarf magnetic field. In particular, improved statistics of mCVs would help to address open questions on their formation and evolution. We performed an optical spectroscopy survey to search for signatures of magnetic accretion in 45 variable objects selected mostly from the CRTS. In this sample, we found 32 CVs, 22 being mCV candidates, 13 of which were previously unreported as such. If the proposed classifications are confirmed, it would represent an increase of 4% in the number of known polars and 12% in the number of known IPs. A fraction of our initial sample was classified as extragalactic sources or other types of variable stars by the inspection of the identification spectra. Despite the inherent complexity in identifying a source as an mCV, variability-based selection, followed by spectroscopic snapshot observations, has proved to be an efficient strategy for their discoveries, being a relatively inexpensive approach in terms of telescope time.

Key words: binaries: close – novae, cataclysmic variables – stars: dwarf novae – stars: variables: general – techniques: spectroscopic

Supporting material: data behind figure, machine-readable table


CSS0104-03 (D/IP)
CSS0213+00 (E)
MLS0227+13 (P)
CSS0315-01 (E)
CSS0326+25 (D)
CSS0357+10 (P)
MLS0456+18 (P)
XMM0630-60 (N)
MLS0720+17 (P)
1RXS0721-05 (HA)
4500
5000
5500
6000
6500
7000

Participação em outros projetos

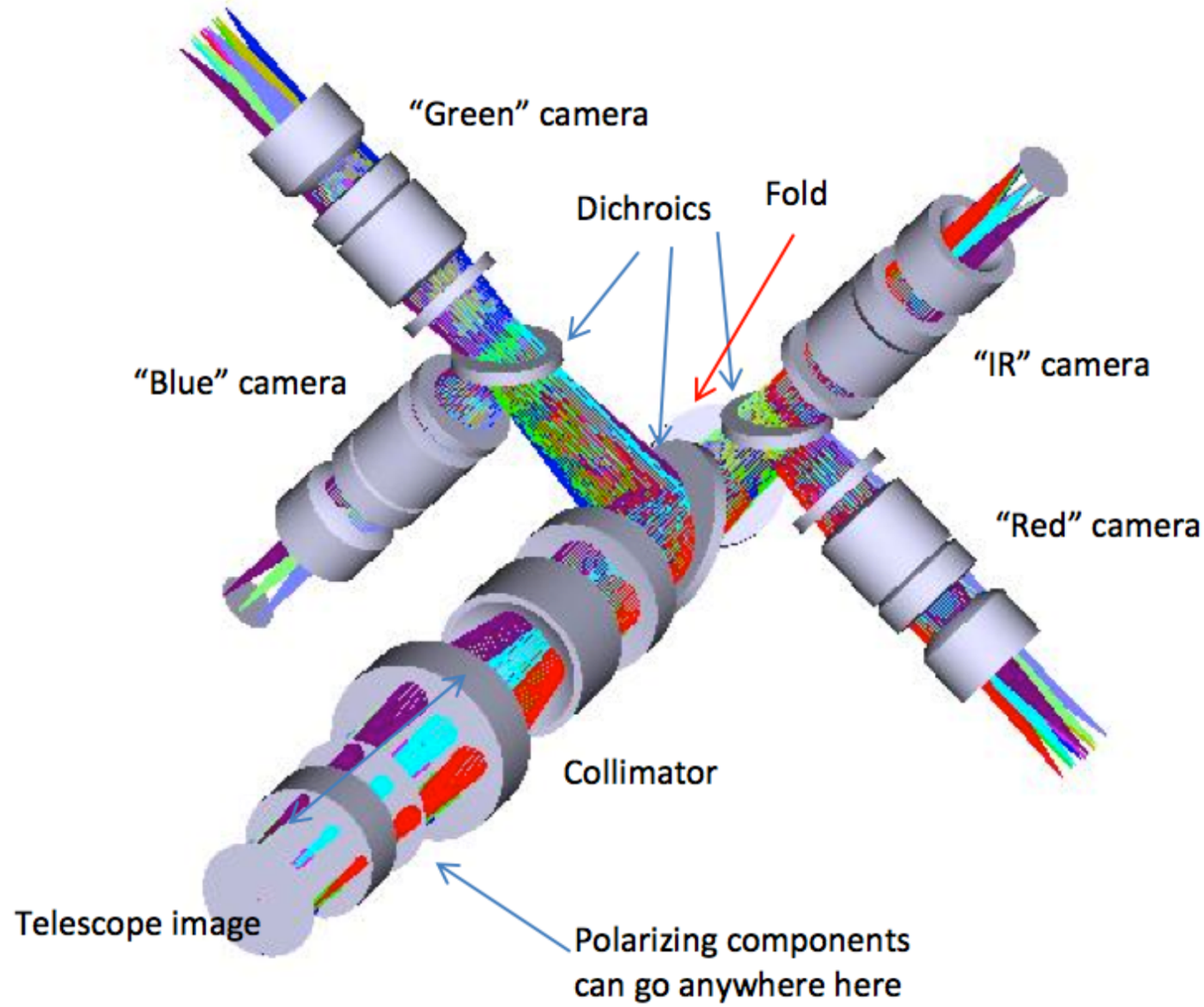
* Observações detalhadas de duas polares
  - Em colaboração com Alexandre S. Oliveira et al (Univap)

* Estudo estatísitico de estados altos e baixos de polares
  - Karleyne M. G. Silva (Gemini)

* Polarimetria de AR Sco
  - Jaziel G. Coelho

Instrumentação astronômica

SPARC4



* Projeto de instrumento para telescópio 1.6m do OPD
* Câmera 4 bandas simultâneas (griz)
  - polarimetria
  - resolução temporal da ordem/melhor que 1s

SPARC4

* Destaque 2016: Aprovação Finep
* Entregas
  - câmeras científicas
  - dicróicos
  - colimador, câmeras ópticas (2017)
* Encomendado
  - óptica polarimétrica (2016)
* Na oficina (2017)
  - barris da óptica principal
* Finalização do projeto mecânico e controle em curso

Pós-graduação

Pós-graduação

* 2 disciplinas em 2016
  - Técnicas observacionais em astrofísica
  - Variáveis cataclísmicas
* Orientações
  - Conclusão de duas dissertações
    * Isabel de Jesus Lima (2016)
    * Lorena do Carmo Jesus (2016)
  - Em andamento (2017)
    * Isabel de Jesus Lima (D - Fapesp)
    * Yasmin Amado (M - Capes)
    * Sarah Villanova Borges (M - ITA)

Perspectivas 2017

* Submissão de artigo de AE Aqr

* Submissão de artigo de V348 Pav
  - Doutorado de Matheus S. Palhares (Univap)

* Construção SPARC4

Obrigada!