

# Cláudia Vilega Rodrigues

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Abril/2015

Workshop da DAS - Atividades 2014

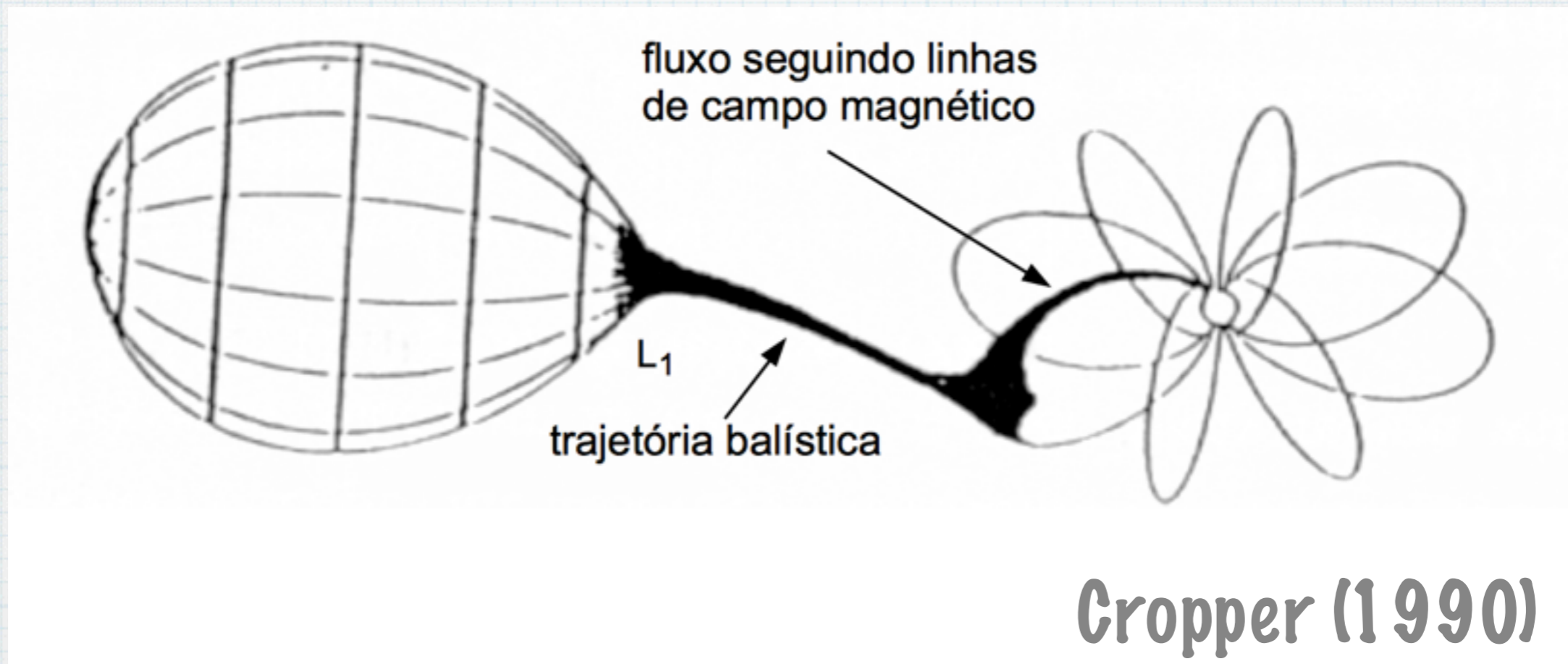


# **Variáveis cataclísmicas, com ênfase nas magnéticas**



# Polares

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







- \* Modelos para emissão de polares no óptico e em raios X
- \* Principais colaboradores
  - Joaquim E. R. Costa
  - Karleyne M. G. da Silva



# Observação de polares

- \* Obtenção de dados
  - polarimétricos - LNA
  - espectroscópicos - SOAR
- \* Colaboração com
  - Alexandre S. de Oliveira
  - Deonísio Cieslinski
  - Francisco Jablonski
  - Karleyne M. G. Silva
  - Leonardo A. Almeida



# MLS110213:022733+130617: A new eclipsing polar above the period gap<sup>\*†</sup>

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J. E. R. Costa<sup>2</sup> & F. J. Jablonski<sup>2</sup>

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<sup>2</sup> *Instituto Nacional de Pesquisas Espaciais (INPE/MCTI) – Av. dos Astronautas, 1758 - São José dos Campos - SP – Brazil*

<sup>3</sup> *Instituto de Astronomia, Geofísica e Ciências Atmosféricas (IAG/USP) – Rua do Matão 1226 - São Paulo - SP – Brazil*

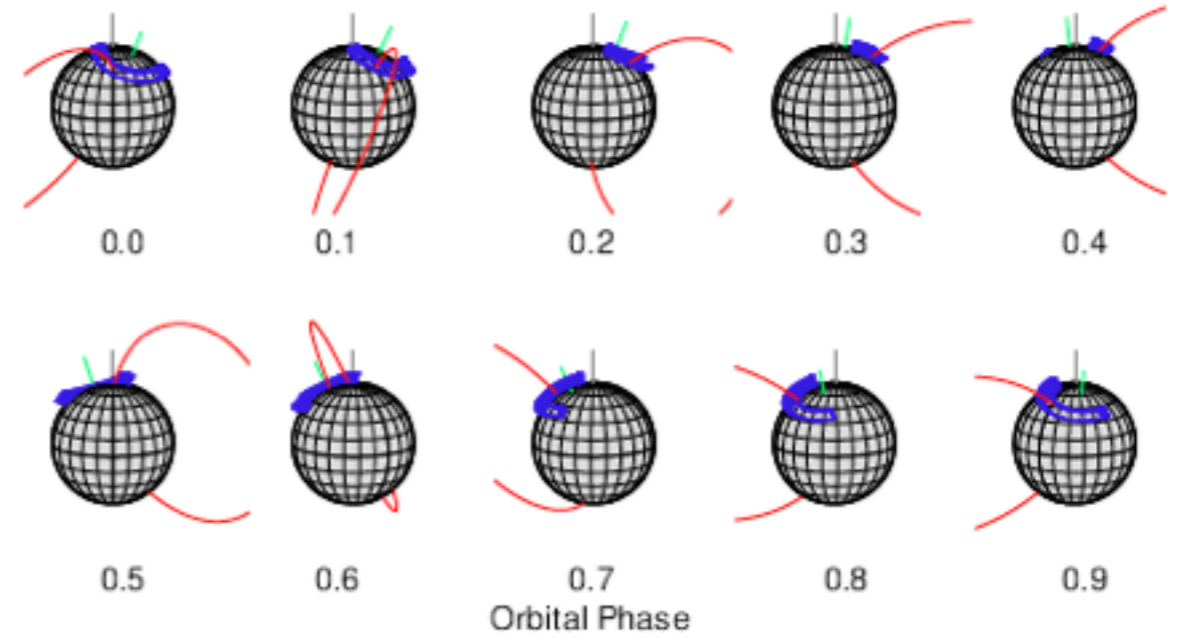
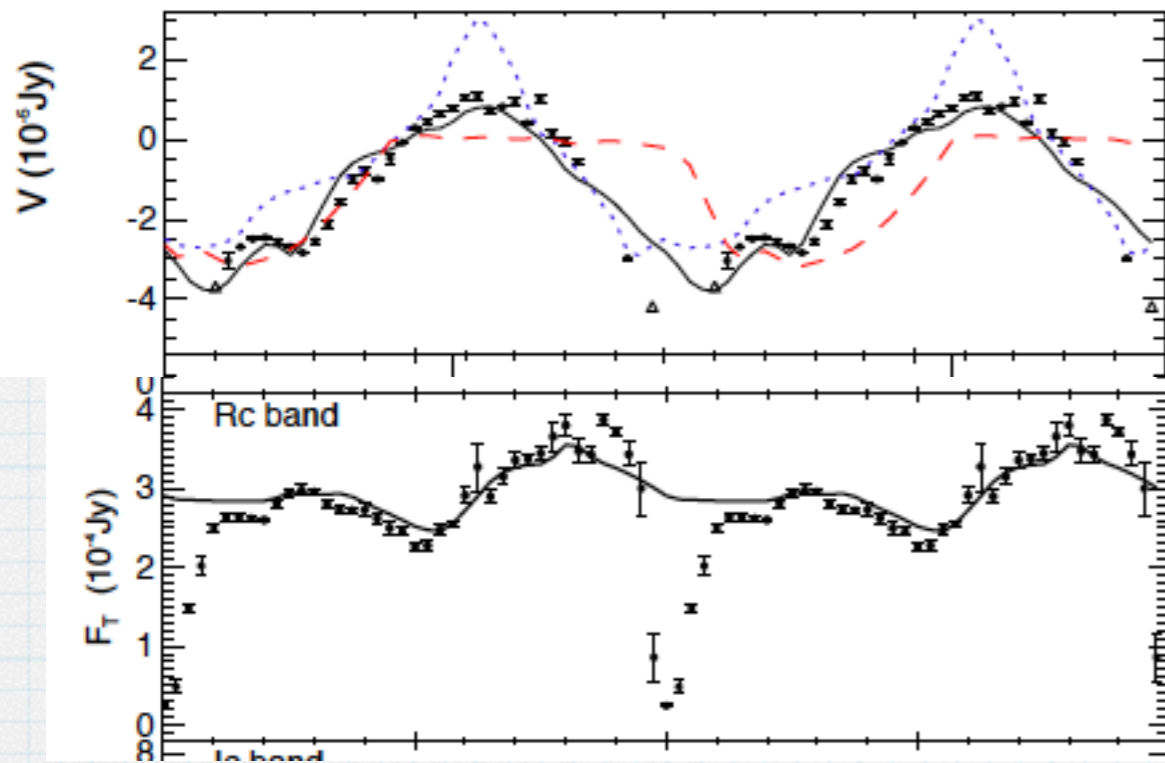
8 January 2015

## ABSTRACT

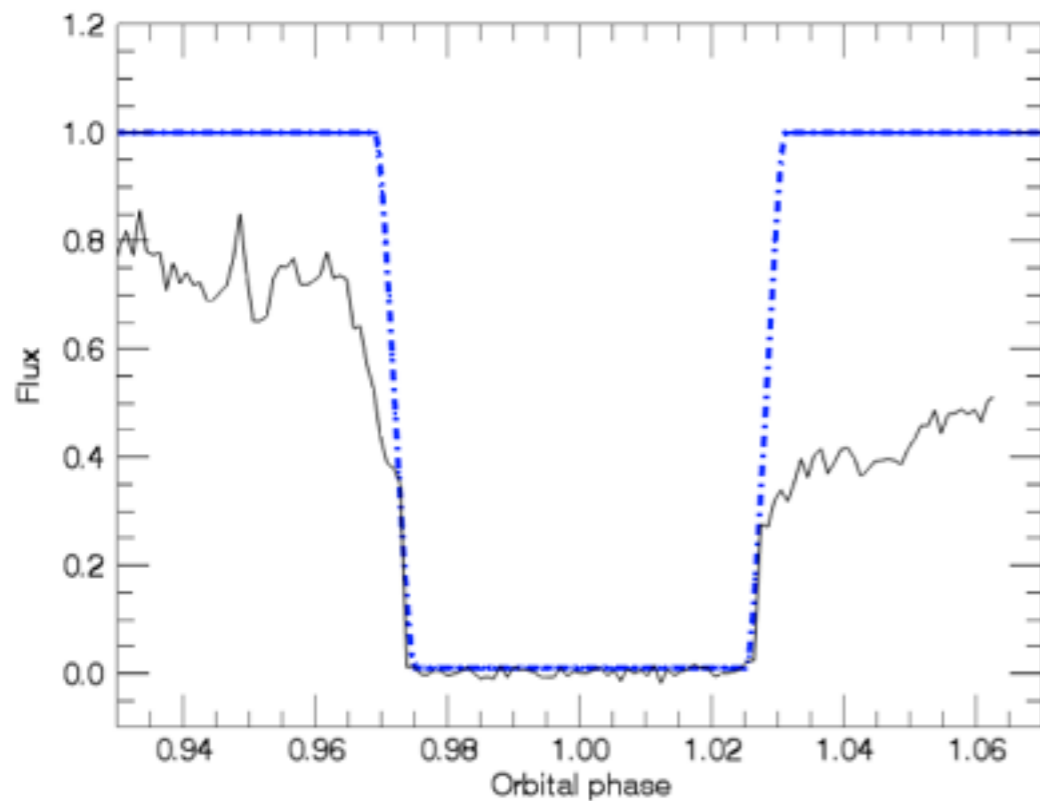
This study confirms MLS110213:022733+130617 as a new eclipsing polar. We performed optical spectroscopic, polarimetric and photometric follow-up of this variable source identified by the Catalina Real Time Transient Survey. Using the mid-eclipse times, we estimated an orbital period of 3.787 h, which is above the orbital period gap of the cataclysmic variables. There are nine other known polars with longer orbital periods, and only two of them are eclipsing. We identified high and low-brightness states and high polarization modulated with the orbital period. The spectra are typical of polars, with strong high ionization emission lines and inverted Balmer decrement. The He II 4686 Å line is as strong as H $\beta$ . We modelled the photometric and polarimetric bright-state light curves using the CYCLOPS code. Our modelling suggests an extended emitting region on the WD surface, with a mean temperature of 9 keV and B in the range 18 – 33 MG. The WD mass estimated from the shock temperature is 0.67 M $_{\odot}$ . The distance was estimated as 406 $\pm$ 54 pc using the Period-Luminosity-Colours method. MLS110213 populates a rare sub-group of polars, near the upper limit of the period distribution, important to understand the evolution of mCVs.

**Key words:** magnetic fields – polarization – radiative transfer – novae, cataclysmic variables – binaries: eclipsing – stars: individual: MLS110213:022733+130617

Em revisão, MNRAS



**Figure 8.** Geometrical representation of the emitting region on the WD surface in MLS110213. The post-shock region is represented by its walls (blue lines). The curved red line near the centre of the emitting region is a magnetic field line threading the emitting region. It is shown to represent the accretion column geometry. The radial green line is the magnetic axis.



```
IDL> mls, q=0.42, inc=75.5
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q:                0.420000
M2(Msun):         0.27902418
M1(Msun):         0.66434331
a(cm)             8.3847300e+08
r1(a)             0.0096577320
r2(a)             0.30276864
r1(Rsun)          0.011643058
r2(Rsun)          0.36500837
Size of emitting region in the WD surface (in units of a)  0.0096577320

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# Polarimetria de SW Sextantis

\* Apresentação da Isabel



# Formação estelar



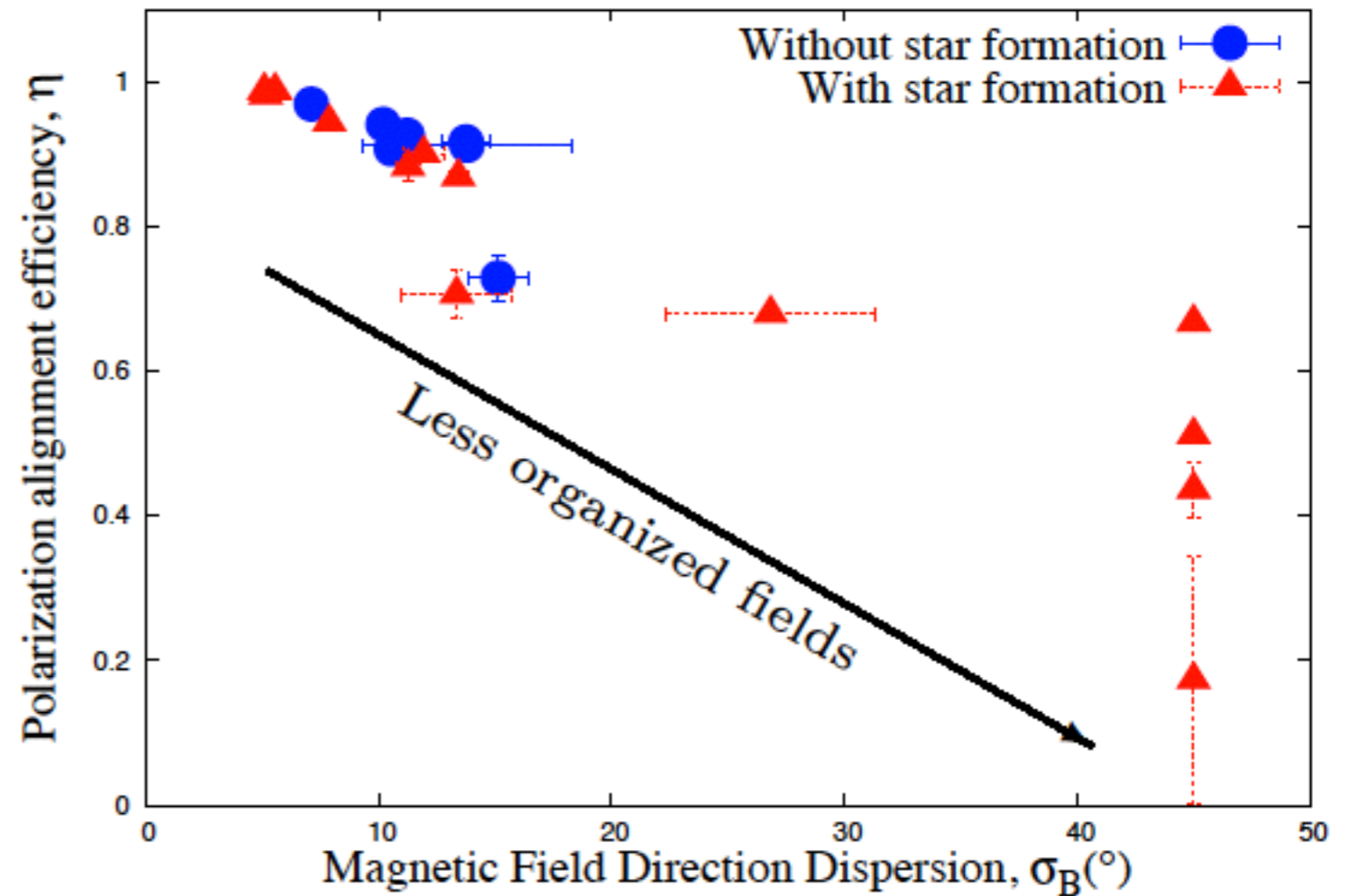
# Formação estelar

- \* Trabalhos com ênfase no mapeamento do campo magnético interestelar
- \* Colaboração
  - Victor de S. Magalhães
  - Antonio Pereyra
  - German Racca
  - Williams Vilas Boas



# Rodrigues et al. 2014, IAUS 302

**Figure 3.** Polarisation alignment efficiency,  $\eta$ , and DMFD,  $\sigma_B$ , for star forming globules (red triangles) or quiescent globules (blue circles).



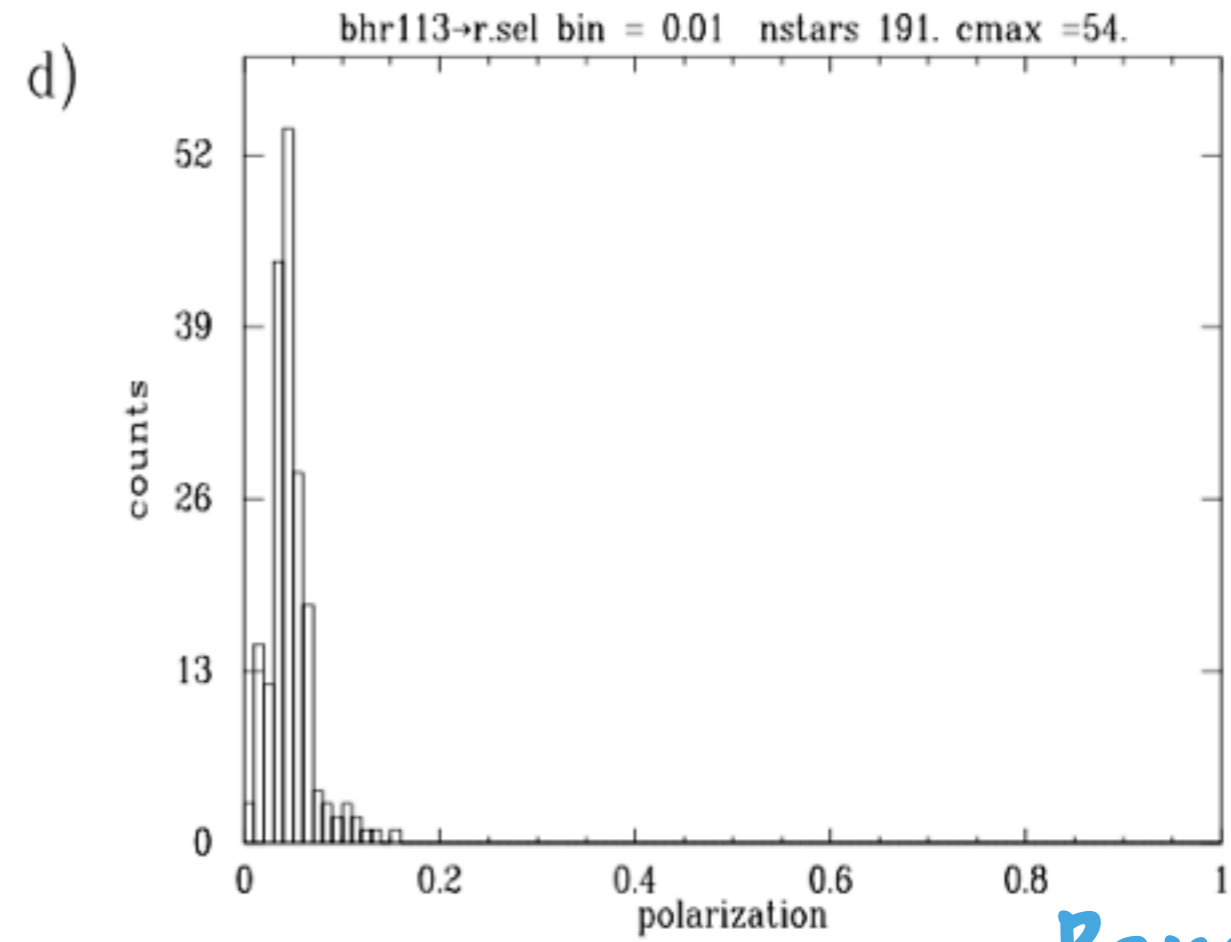
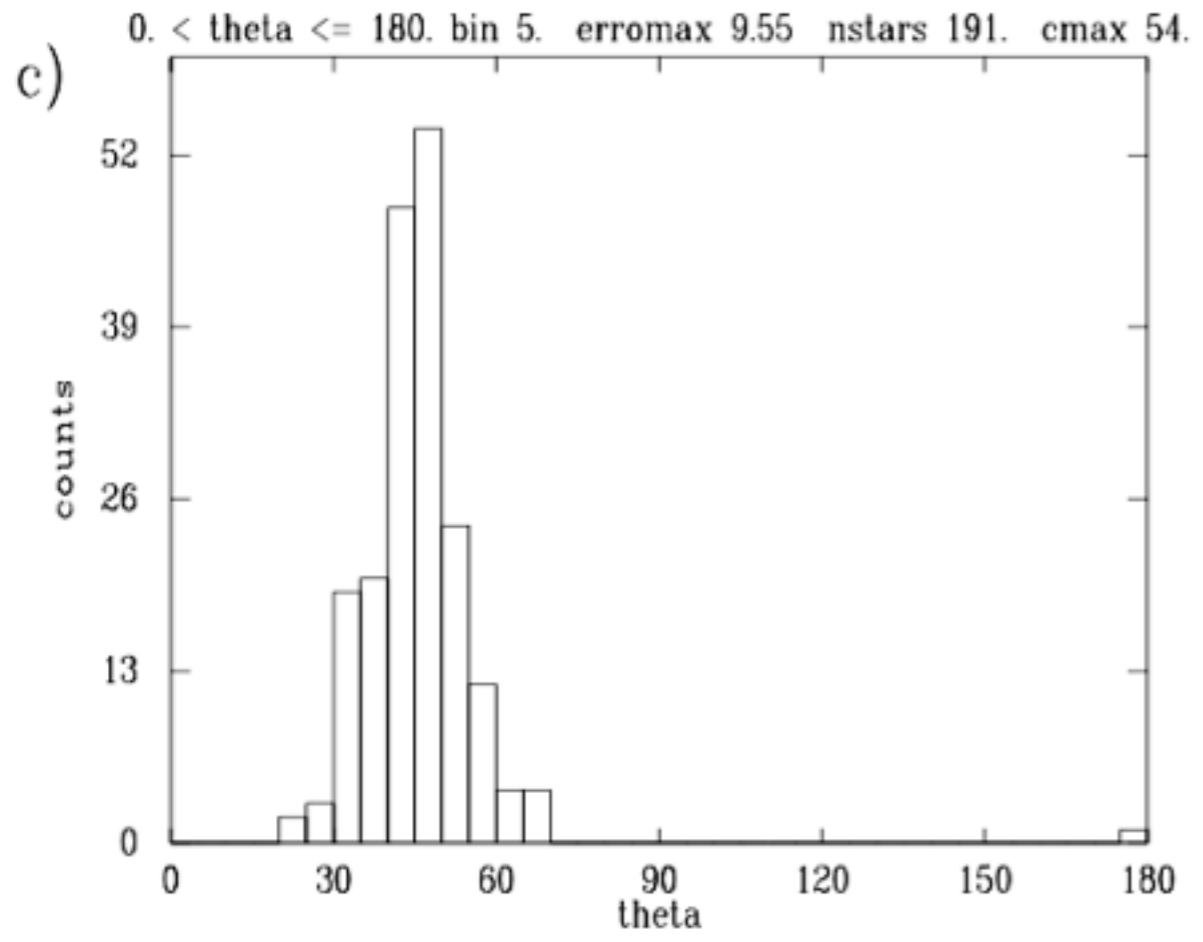
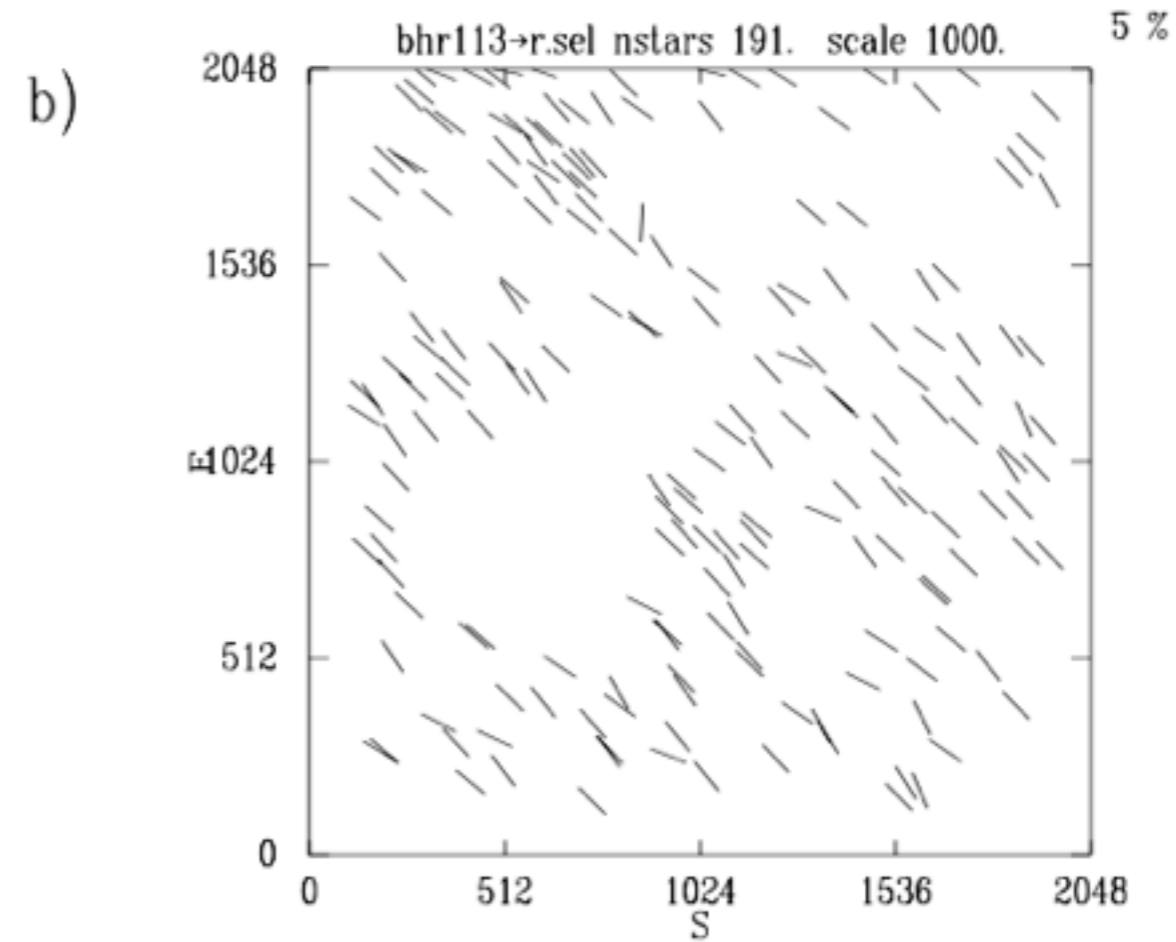
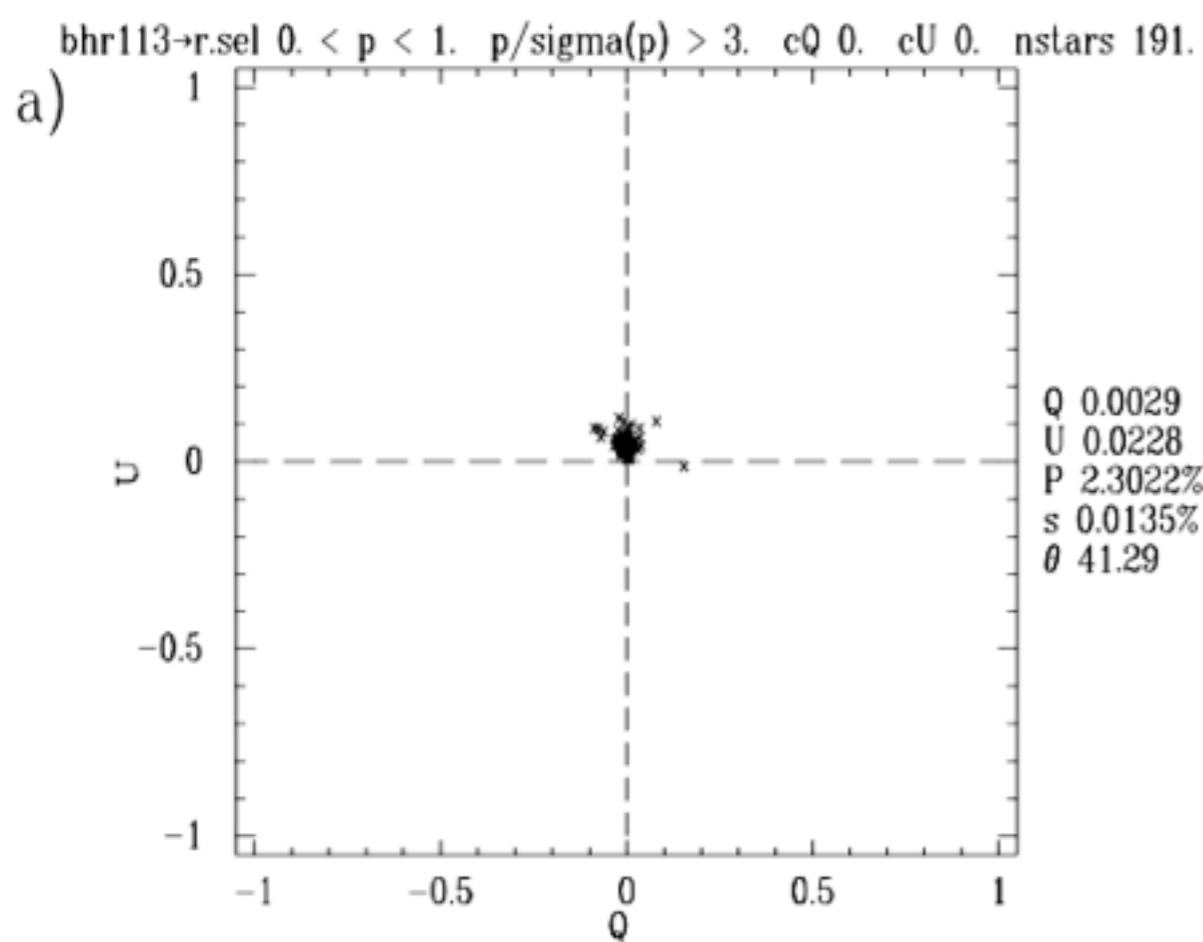
Mestrado - Victor de Souza Magalhães



# Dependência espectral da polarização interestelar em glóbulos de Bok

- \* Colaboração com grupo da Universidade de São Petersburgo
- \* Visita da Dra. Marina Prokopyeva

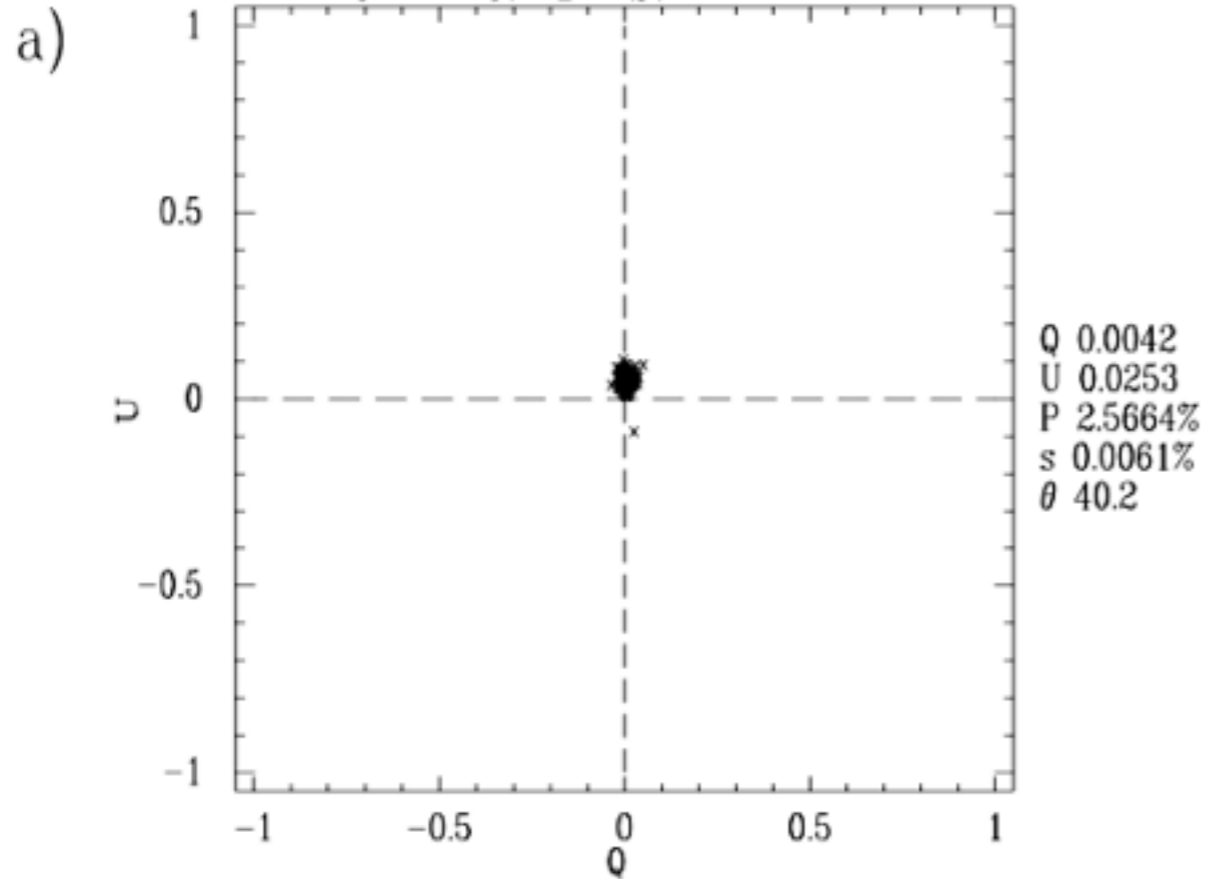




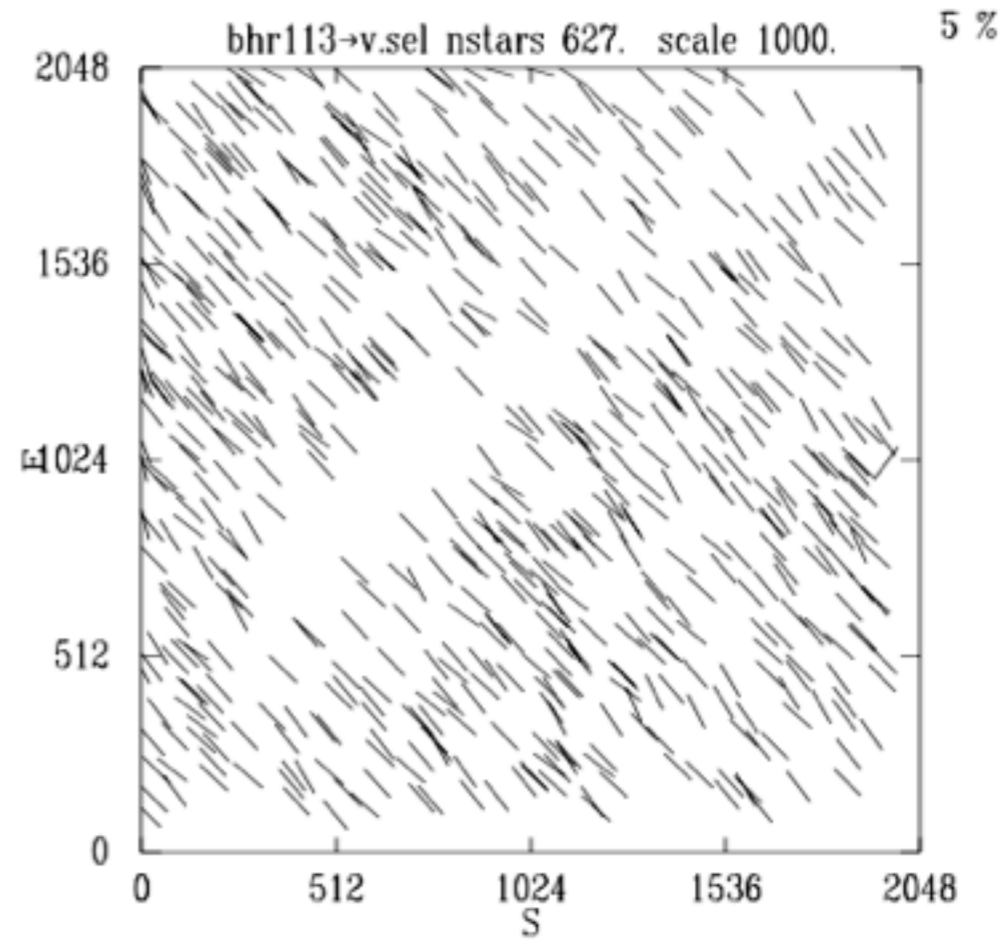
Banda B



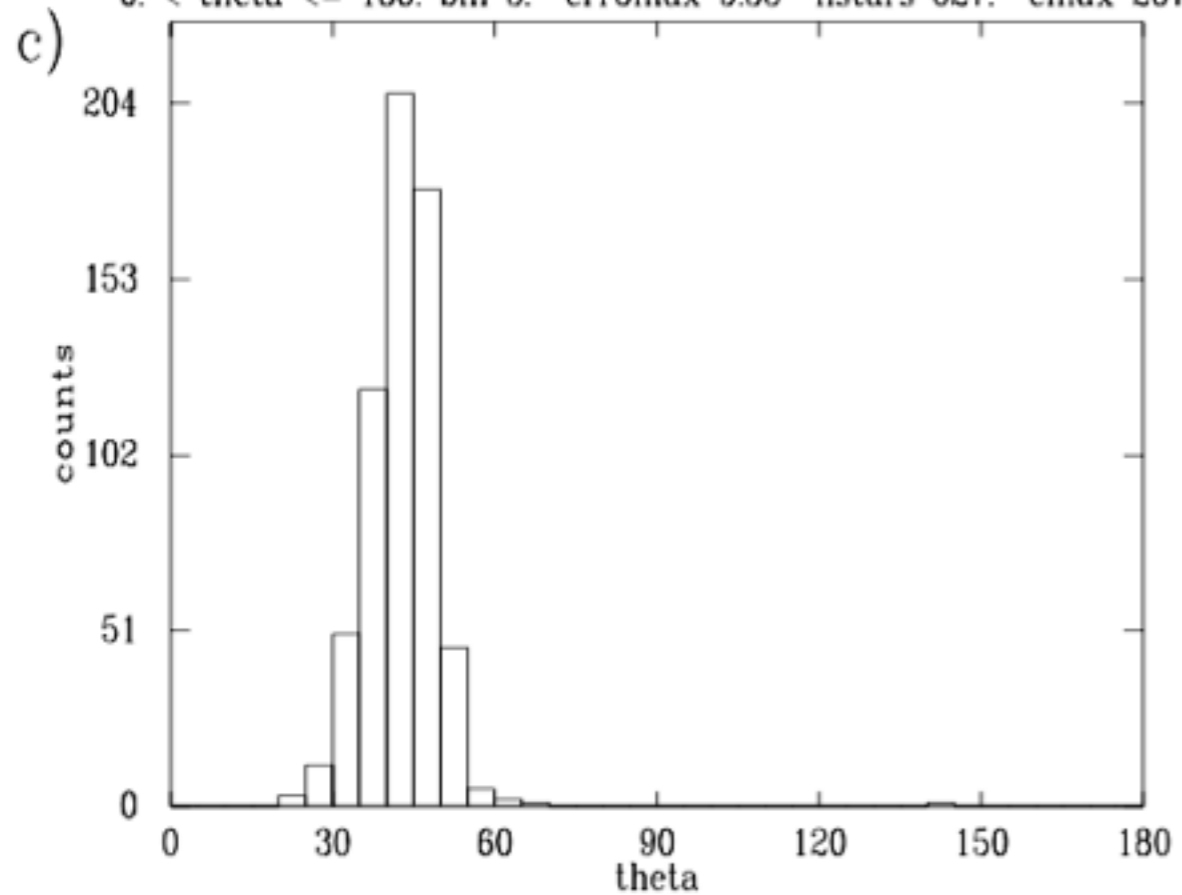
bhr113→v.sel 0. < p < 1. p/sigma(p) > 3. cQ 0. cU 0. nstars 627.



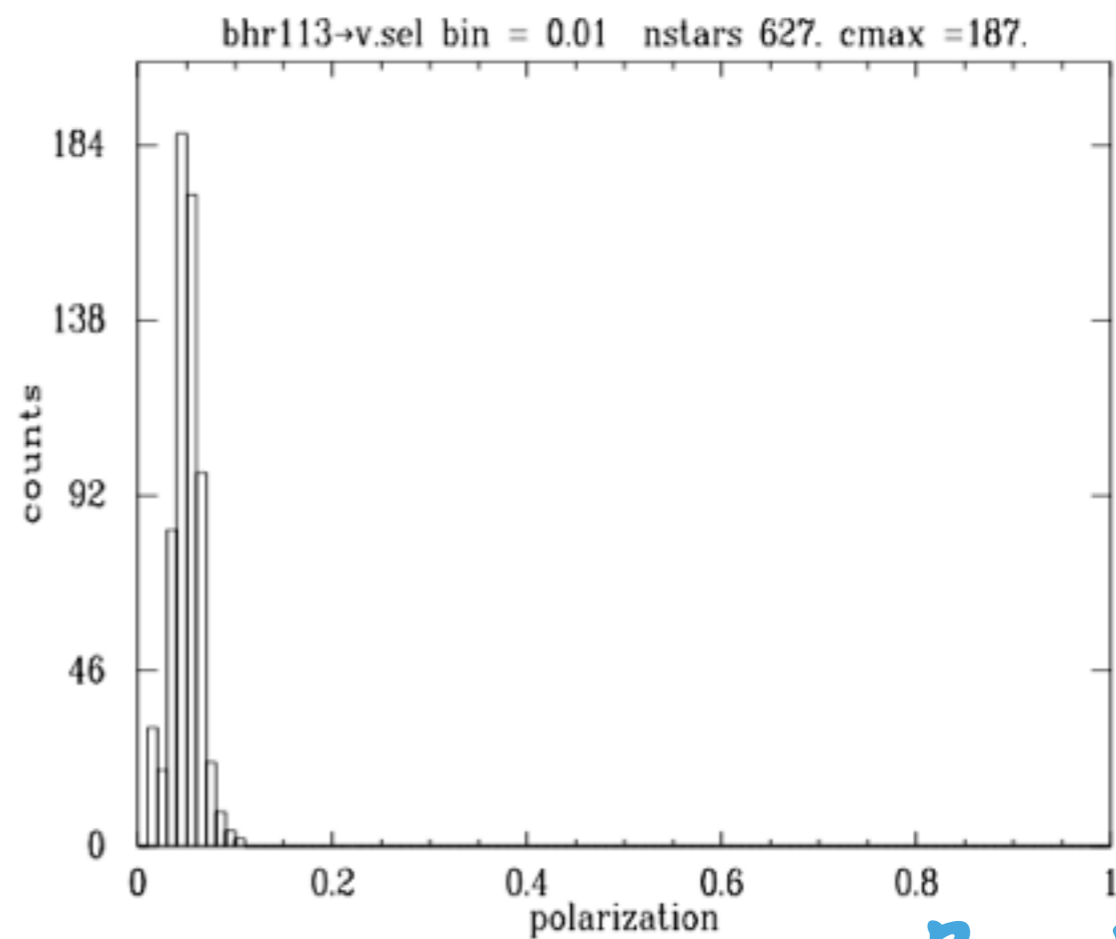
b)



0. < theta <= 180. bin 5. errormax 9.55 nstars 627. cmax 207.

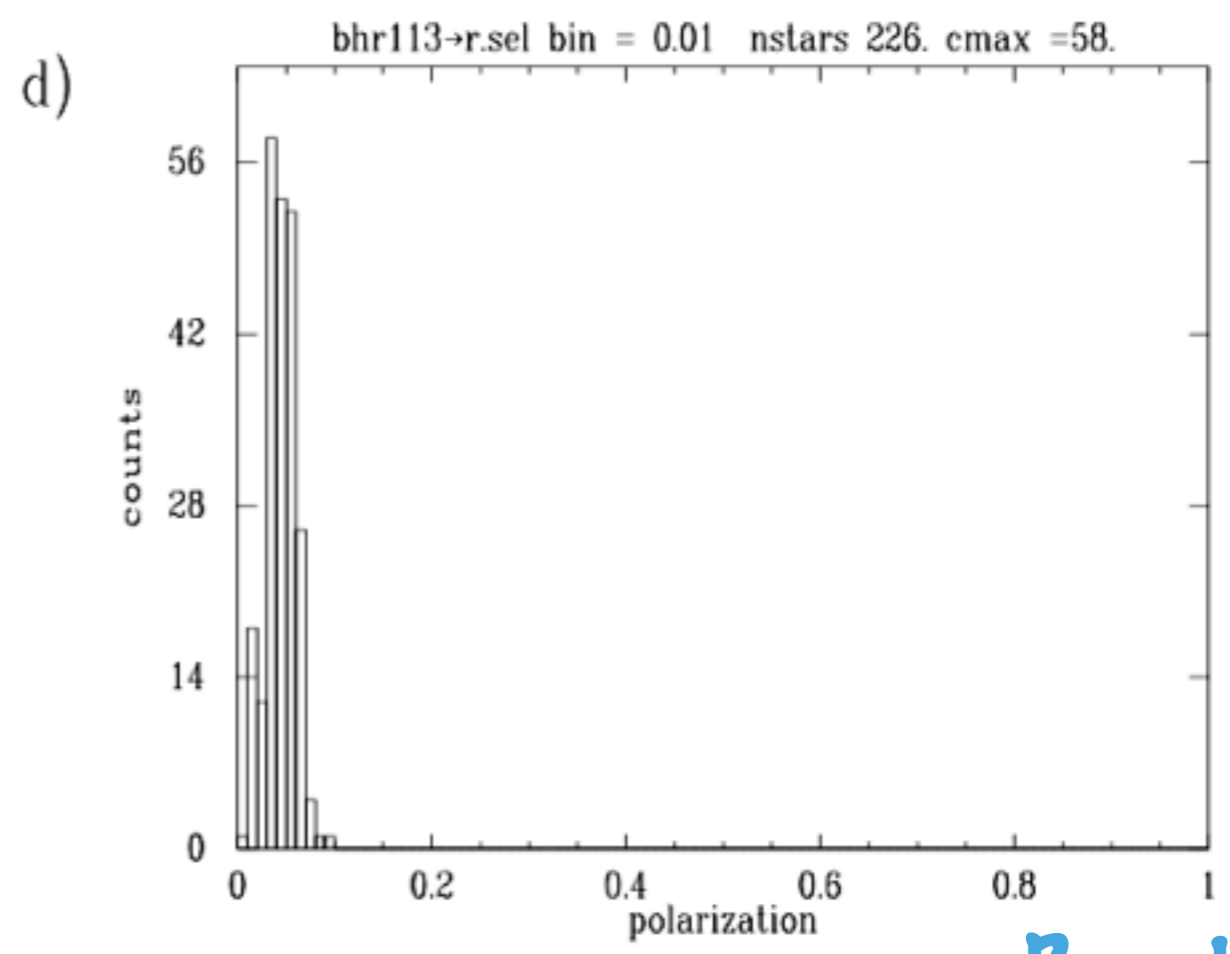
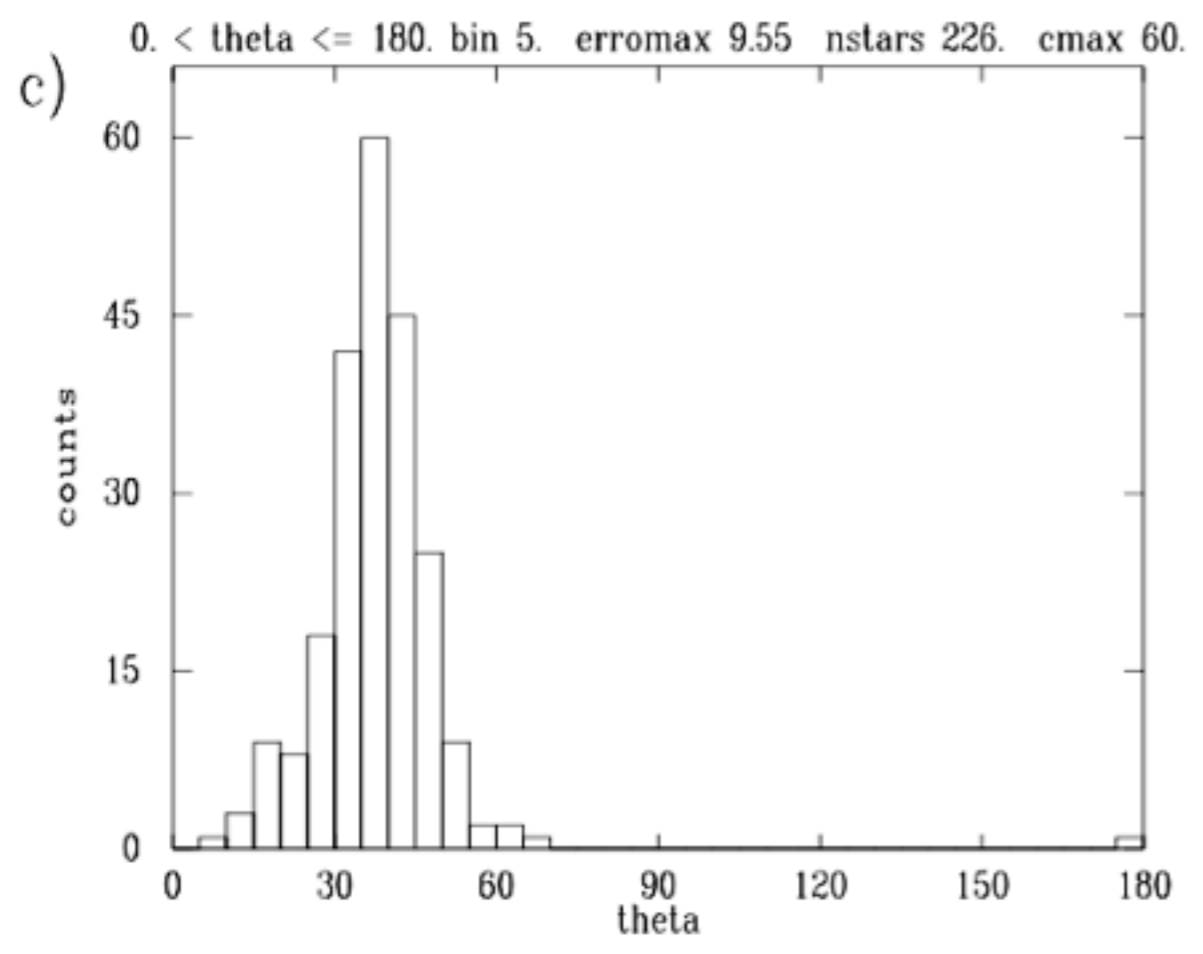
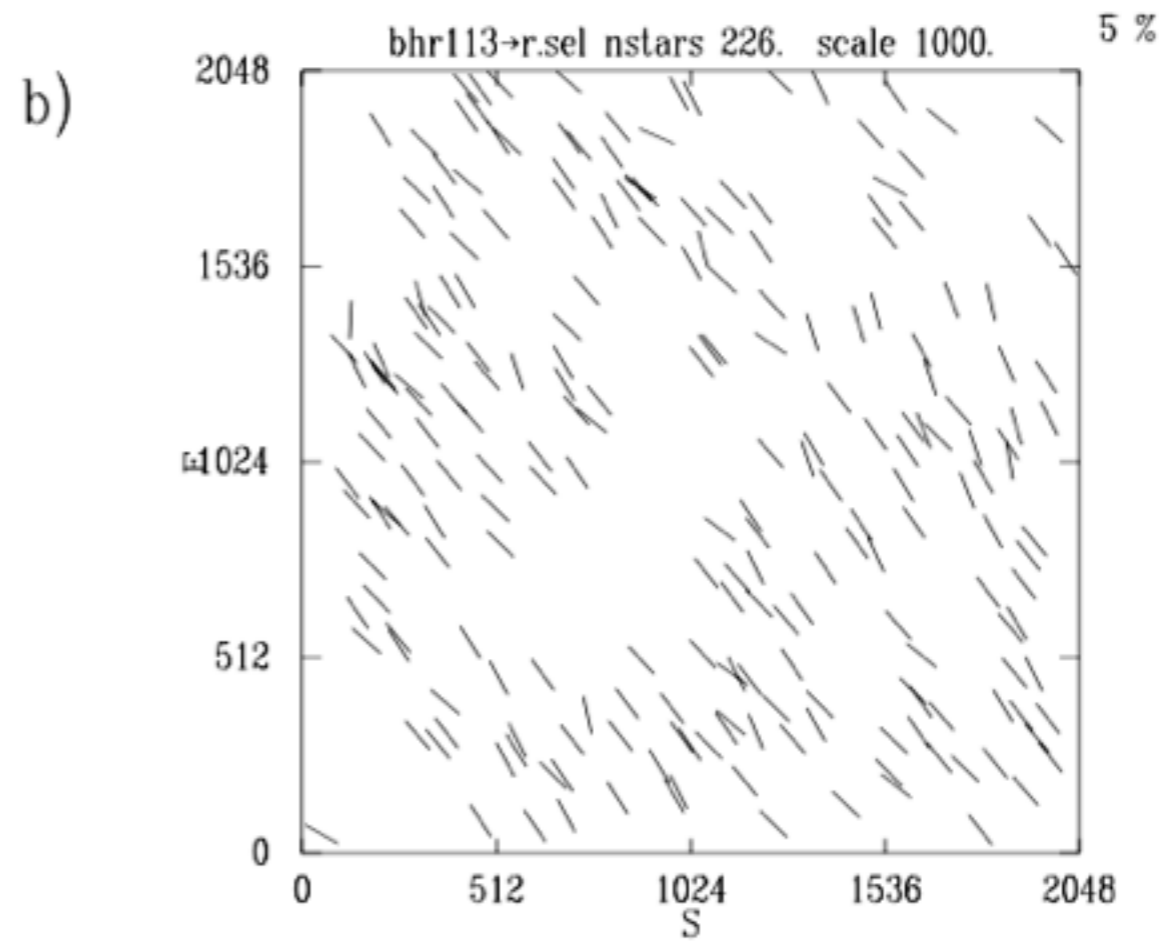
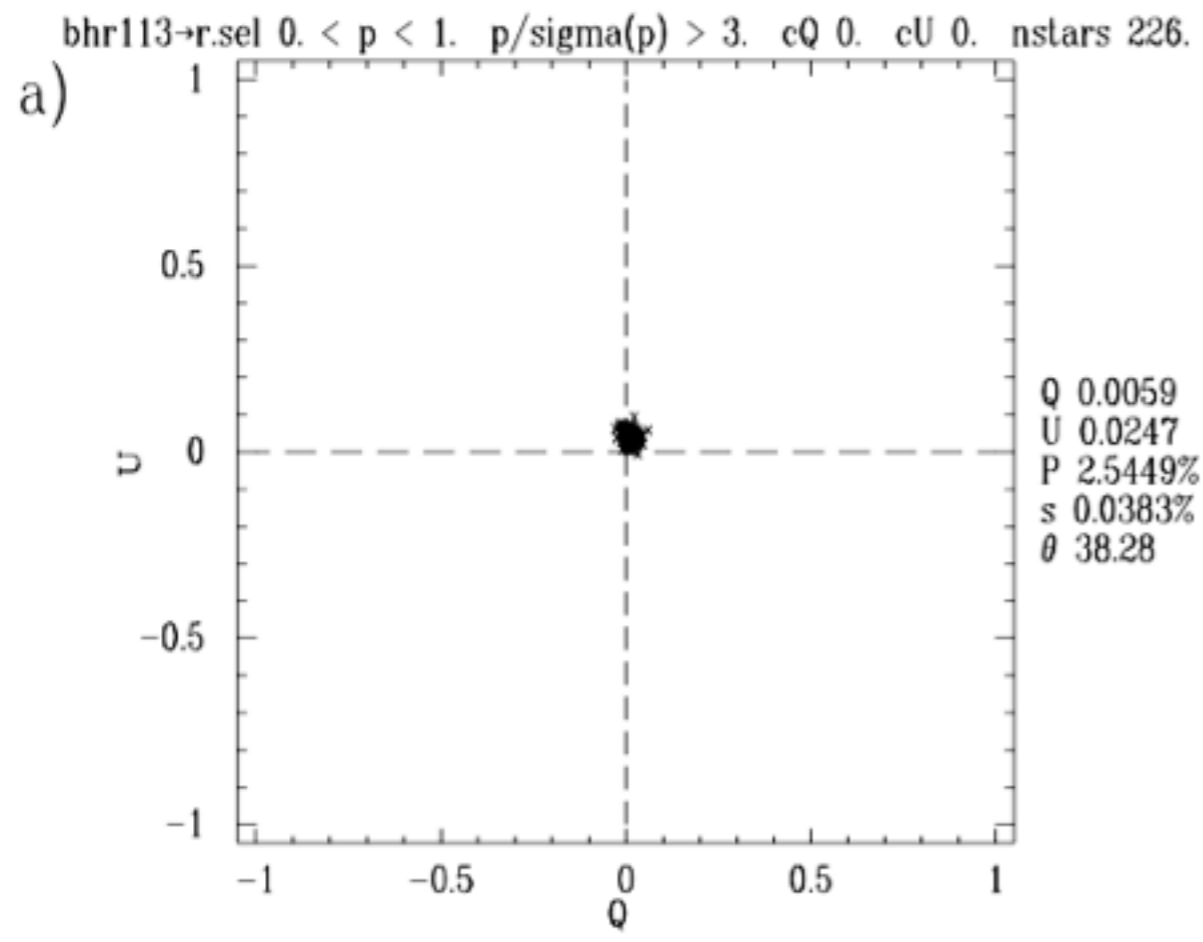


d)



Banda V







# Campo magnético no MI em torno de jatos gigantes

\* Apresentação da Lorena



# **Instrumentação astronômica**



## Measuring the continuum polarization with ESPaDOnS<sup>★</sup>

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### ABSTRACT

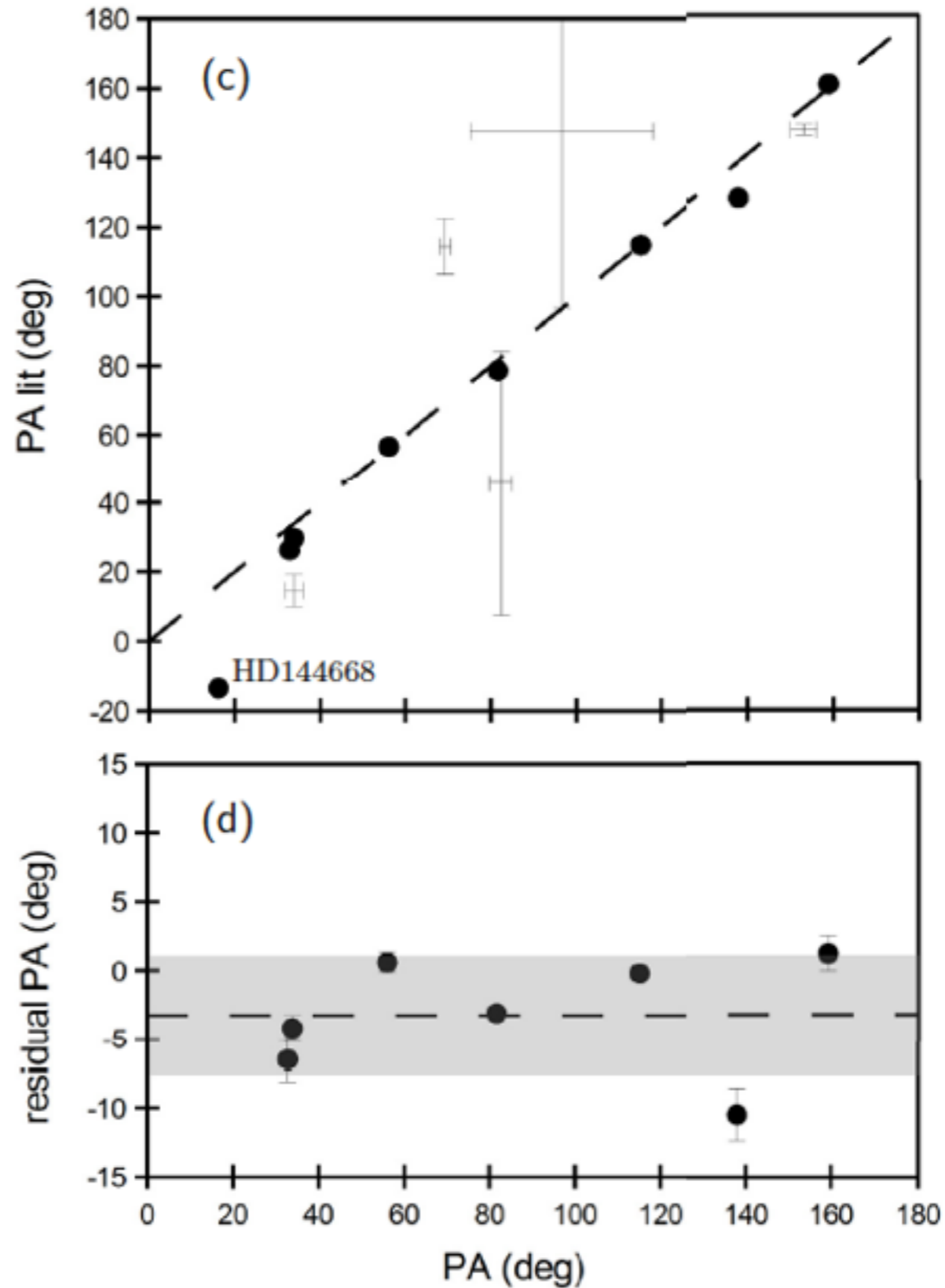
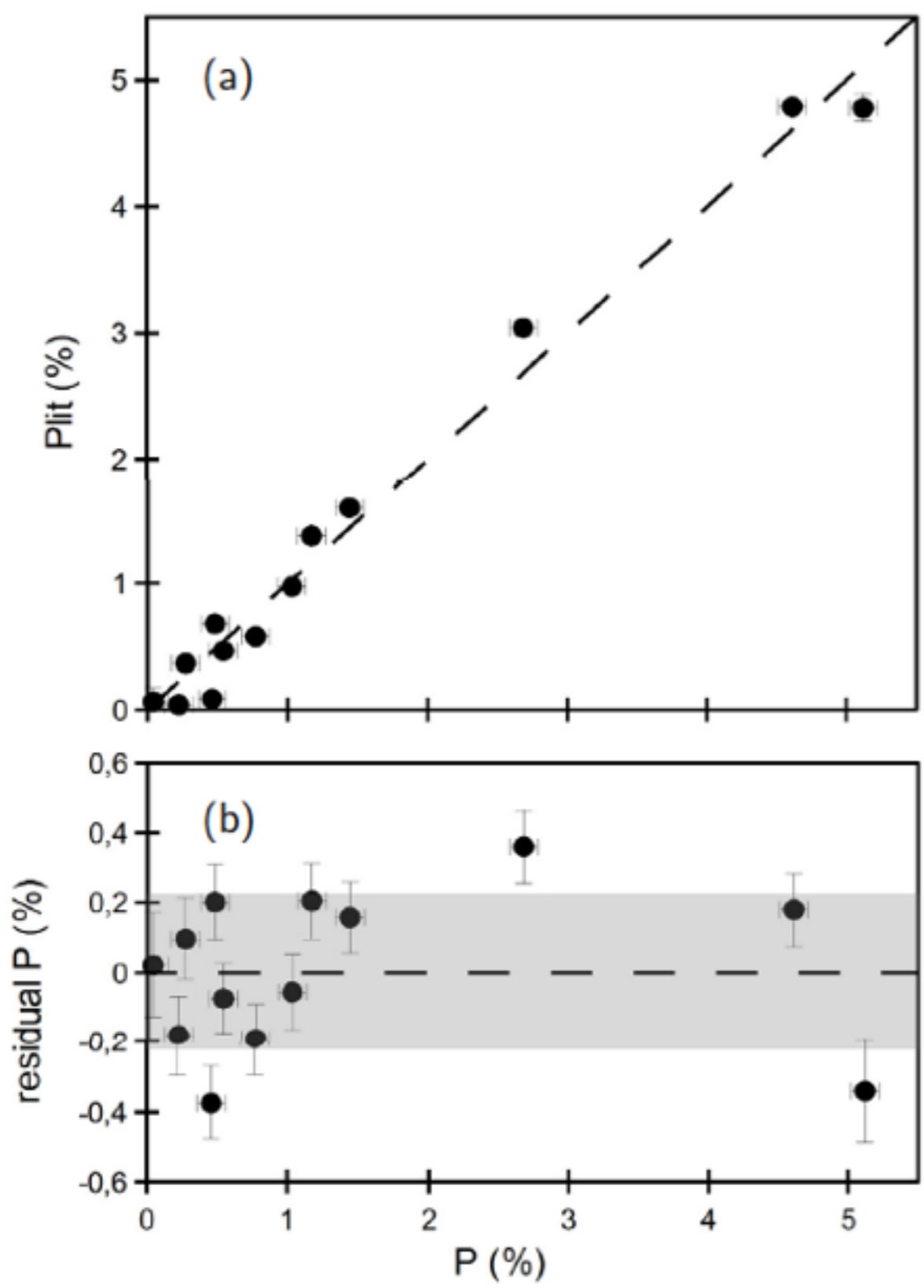
**Aims.** Our goal is to test the feasibility of obtaining accurate measurements of the continuum polarization from high-resolution spectra using the spectropolarimetric mode of ESPaDOnS.

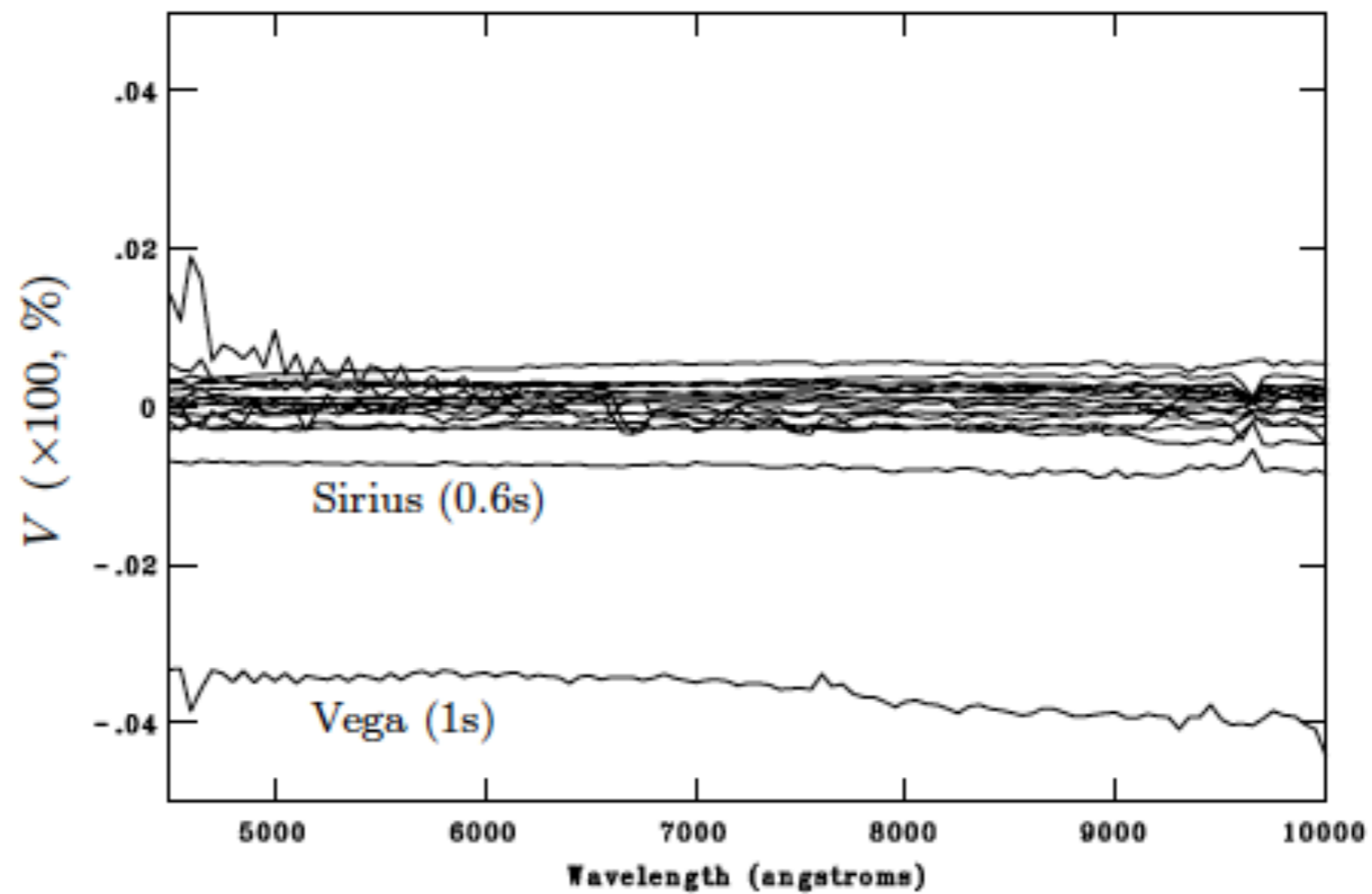
**Methods.** We used the new pipeline OPERA to reduce recent and archived ESPaDOnS data. Several polarization standard stars and science objects were tested for the linear mode. In addition, the circular mode was tested using several objects from the archive with expected null polarization. Synthetic broad-band polarization was computed from the ESPaDOnS continuum polarization spectra and compared with published values (when available) to quantify the accuracy of the instrument.

**Results.** The continuum linear polarization measured by ESPaDOnS is consistent with broad-band polarimetry measurements available in the literature. The accuracy in the degree of linear polarization is around 0.2–0.3% considering the full sample. The accuracy in polarization position angle using the most polarized objects is better than 5°. Consistent with this, the instrumental polarization computed for the circular continuum polarization is also between 0.2–0.3%. Our results suggest that measurements of the continuum polarization using ESPaDOnS are viable and can be used to study many astrophysical objects.

**Key words.** polarization – instrumentation: polarimeters – techniques: polarimetric – stars: pre-main sequence



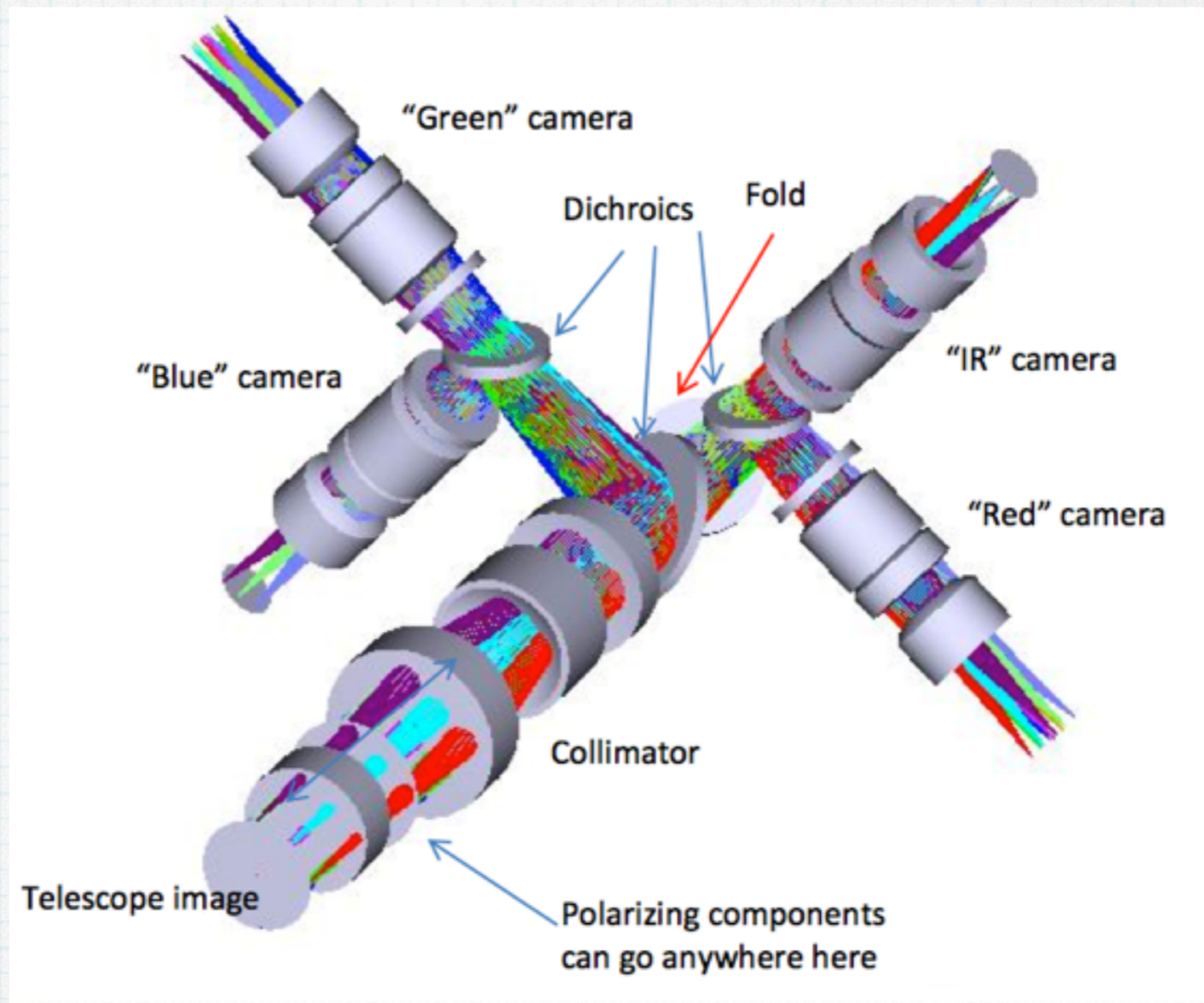




**Fig. 12.** Circular continuum polarization spectra of selected objects from the CFHT archive. Seventeen measurements are shown. The highest levels of  $V$  in two short exposures are indicated with the integration times in parenthesis.



# SPARC4



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



# SPARC4 - 2014

- \* Aquisições

- INPE - Projeto de Vulto CEA/2014

- \* detetores

- LNA

- \* diacróicos

- \* Ainda sem financiamento garantido...



# Outras atividades (2014)

## \* PG/AST

- 2 orientações (de mestrado) em andamento
- Técnicas Observacionais em Astrofísica e Variáveis cataclísmicas
- Conselho de Curso

\* Bolsa Produtividade CNPq - Nível 2

\* Presidente da CP/SOAR e CFHT



# Perspectivas 2015

- \* 2 artigos em revisão
- \* Início construção SPARC4?



**Obrigada!**