Cláudia Vilega Rodrigues

Maio/2016

Workshop da DAS

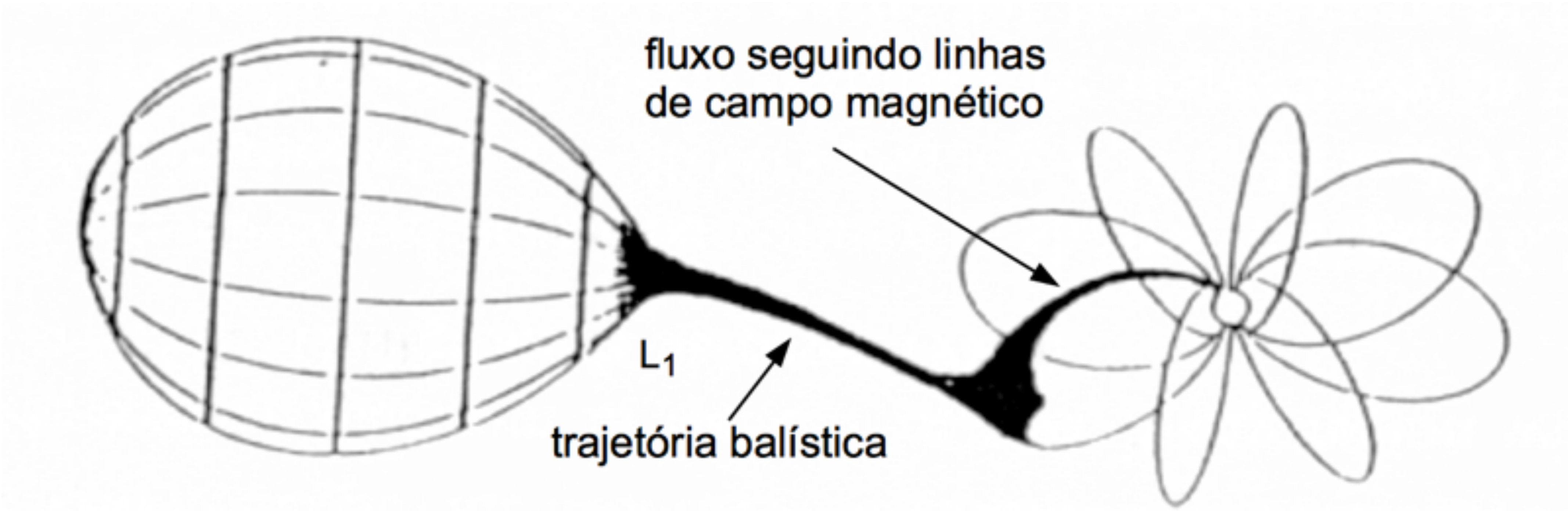
2015 em 1 slide

* Produtividade
  - 3 artigos: 1 ApJ, 1 A&A e 1 MNRAS
* Projeto Instrumental
  - SPARC4 - entrega das câmeras científicas e dicróicos
* 2 orientações em andamento
* Técnicas Observacionais em Astrofísica
* Conselho de Curso
* Bolsa Produtividade CNPq - Nível 2
* CPs: SOAR e CFHT - presidente da CP

Variáveis cataclísmicas, com ênfase nas magnéticas

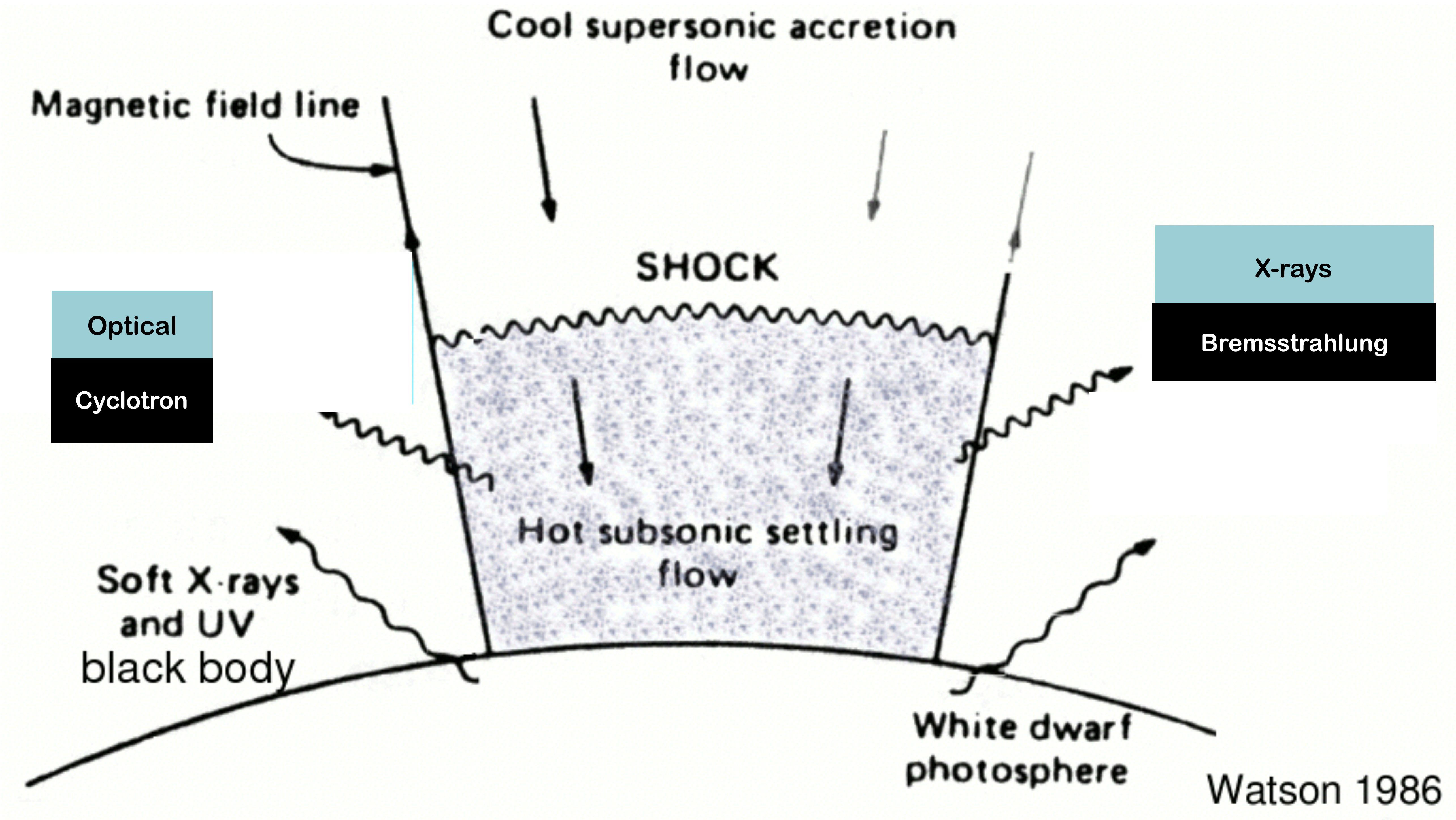
Polares

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



Cropper (1990)

Região emissora



Watson 1986

Cyclops
Cyclotron Emission of Polars

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

- Principais colaboradores
  - Joaquim E. R. Costa
  - Karleyne M. G. da Silva

Monthly Notices
of the
ROYAL ASTRONOMICAL SOCIETY

MNRAS **451,** 4183–4192 (2015) doi:10.1093/mnras/stv1105

MLS110213:022733+130617: a new eclipsing polar above the period gap

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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 (CVs). 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 β. We modelled the photometric and polarimetric bright-state light curves using the CYCLOPS code. Our modelling suggests an extended emitting region on the white dwarf (WD) surface, with a mean temperature of 9 keV and B in the range 18–33, although the possibility that it could be a two-pole accretor cannot yet be ruled out. The WD mass estimated from the shock temperature is 0.67 $M_{\odot}$. The derived parameters are consistent with the eclipse profile. The distance was estimated as 406 ± 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.

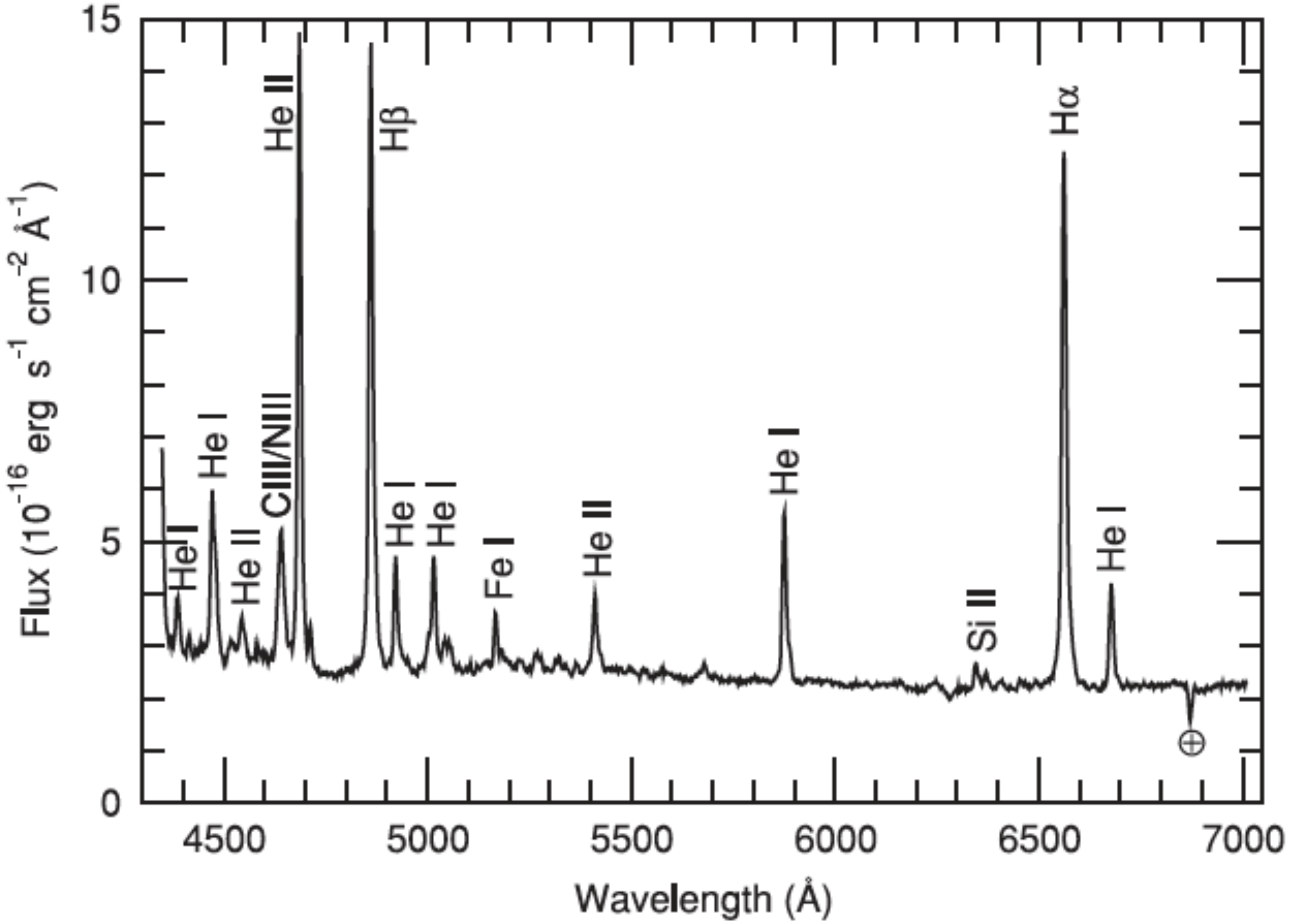

Figure 3. Average spectrum of MLS110213.

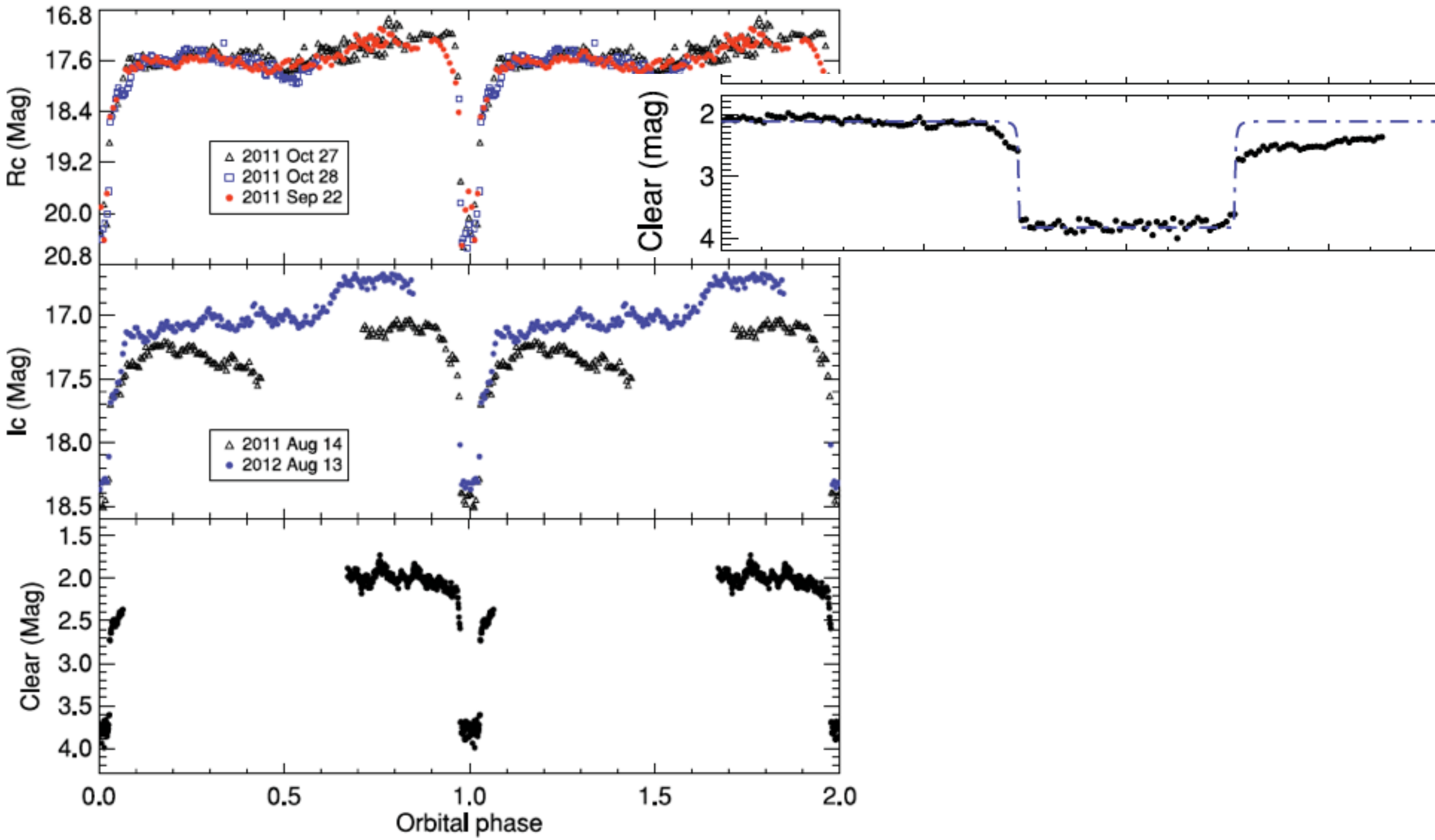

Figure 1. OPD light curves of MLS110213 folded with the ephemeris estimated in Section 3.1. From top to bottom: R_C band, I_C band and white light. White light magnitudes are not calibrated.

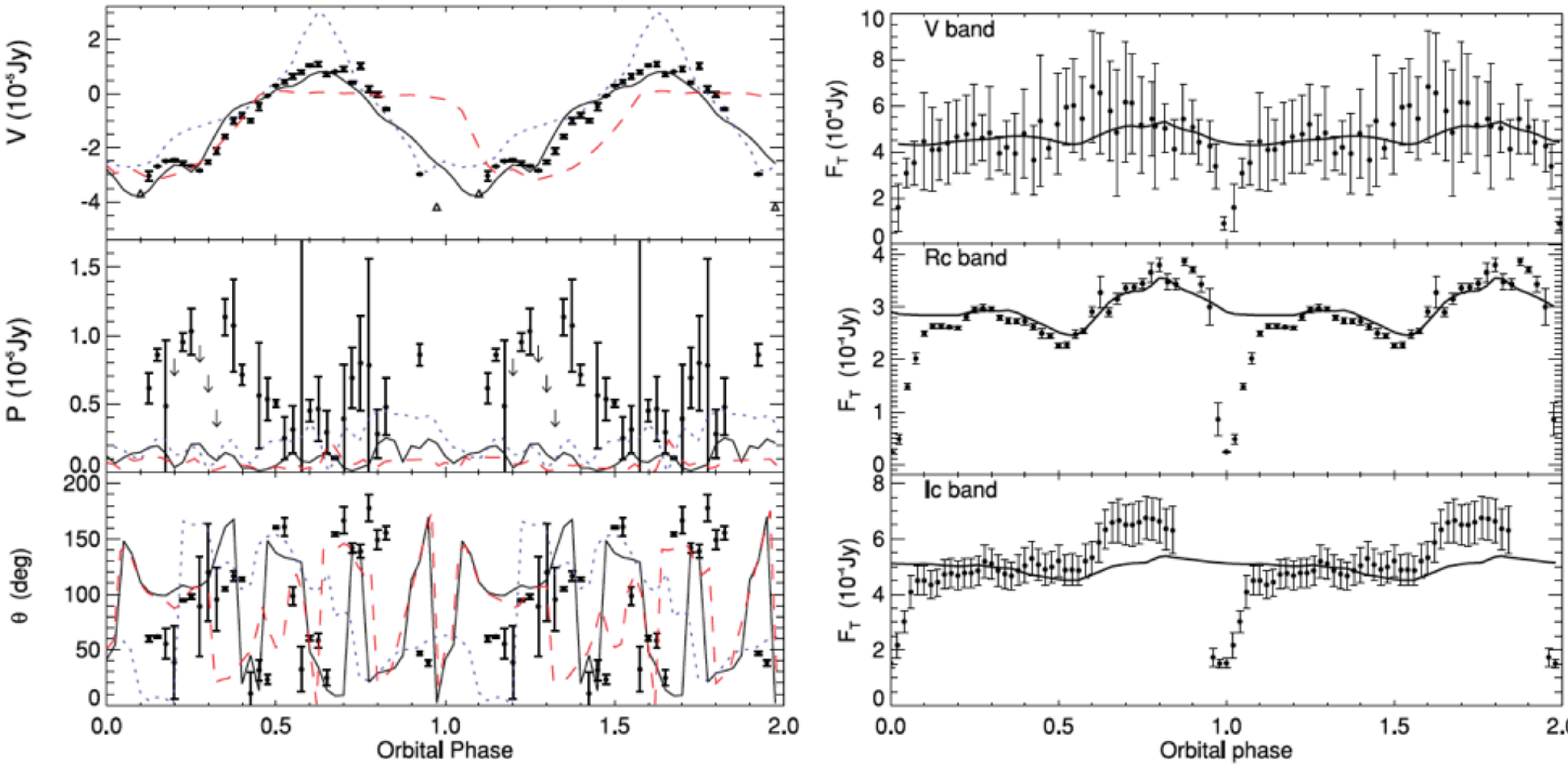

Figure 7. MLS110213 data (points and triangles – the last with no errors estimates) and the best-fitting model (lines) described in text and whose parameters are presented in Table 5. Left-hand panel: polarization modelling. From top to bottom, the panels show circular polarized flux (F_V), linear polarized flux (F_P) and angle of linear polarization (θ). The black dots are the R_C polarization data and the black solid line represents the best R_C model. The blue dotted line is the V-band model prediction and the red dashed line represents the model prediction in I_C band. Right-hand panel: total flux modelling (F_T). From top to bottom, the panels shows the light curves in V, R_C and I_C bands. The black lines are the best models.

CYCLOPS input parameters	Fitted values
i	77°
β	39°
Δ_{long}	87°
Δ_R	0.29
h	0.18 R_{WD}
f_l	0.29
B_{pole}	35 MG
B_{lat}	65°
B_{long}	49°
T_{max}	29 keV
N_{emax}	14.3 cm^{-3}
Model results	Values
B_{reg}	18–33 MG
$\langle T \rangle$	9 keV
T_{pond}	5 keV
T_{range}	1–29 keV
δ_{phase}	−0.11
χ^2	0.395
Stellar parameters	Values
q	0.42
M_1	0.67 $M_\odot$
R_1	0.012 $R_\odot$
M_2	0.28 $M_\odot$
R_2	0.36 $R_\odot$

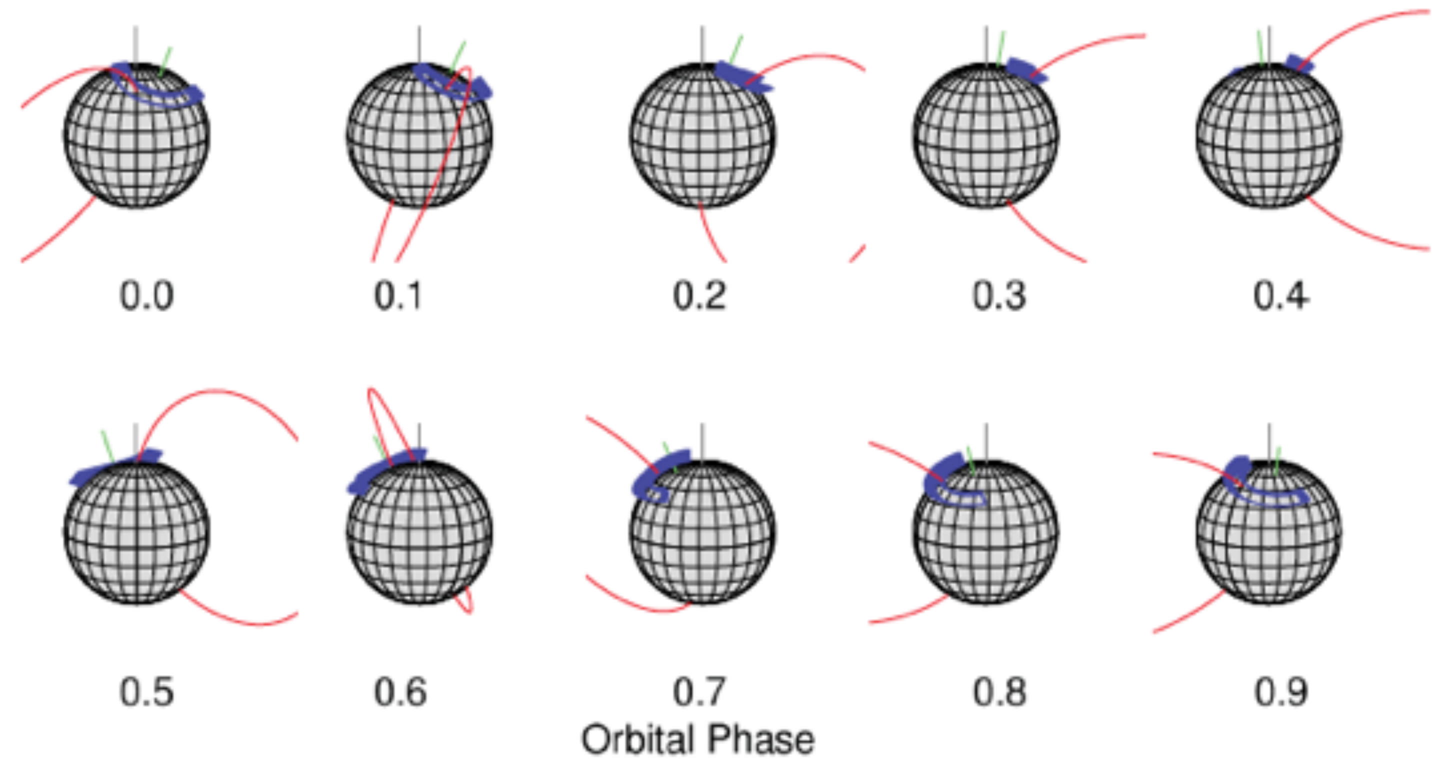

Figure 8. Geometrical representation of the emitting region on the WD surface in MLS110213. The post-shock region is represented by its walls (blue lines). The curved red line near the centre of the emitting region is a magnetic field line threading the emitting region. It is shown to represent the accretion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

Instrumentação astronômica

A&A 573, A133 (2015)
DOI: 10.1051/0004-6361/201423492

http://dx.doi.org/10.1051/0004-6361/201423492

Astronomy & Astrophysics

Measuring the continuum polarization with ESPaDOnS★

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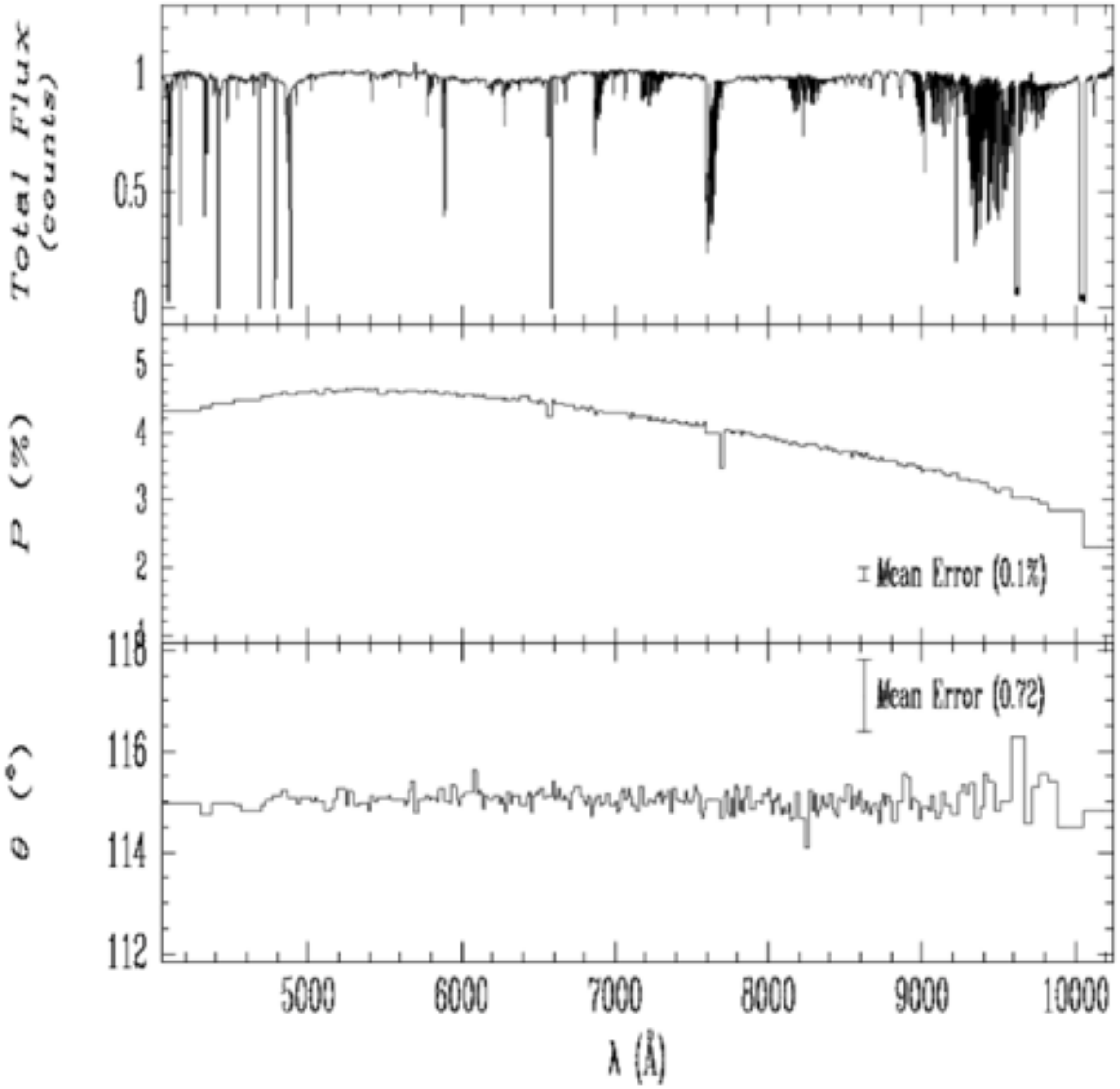
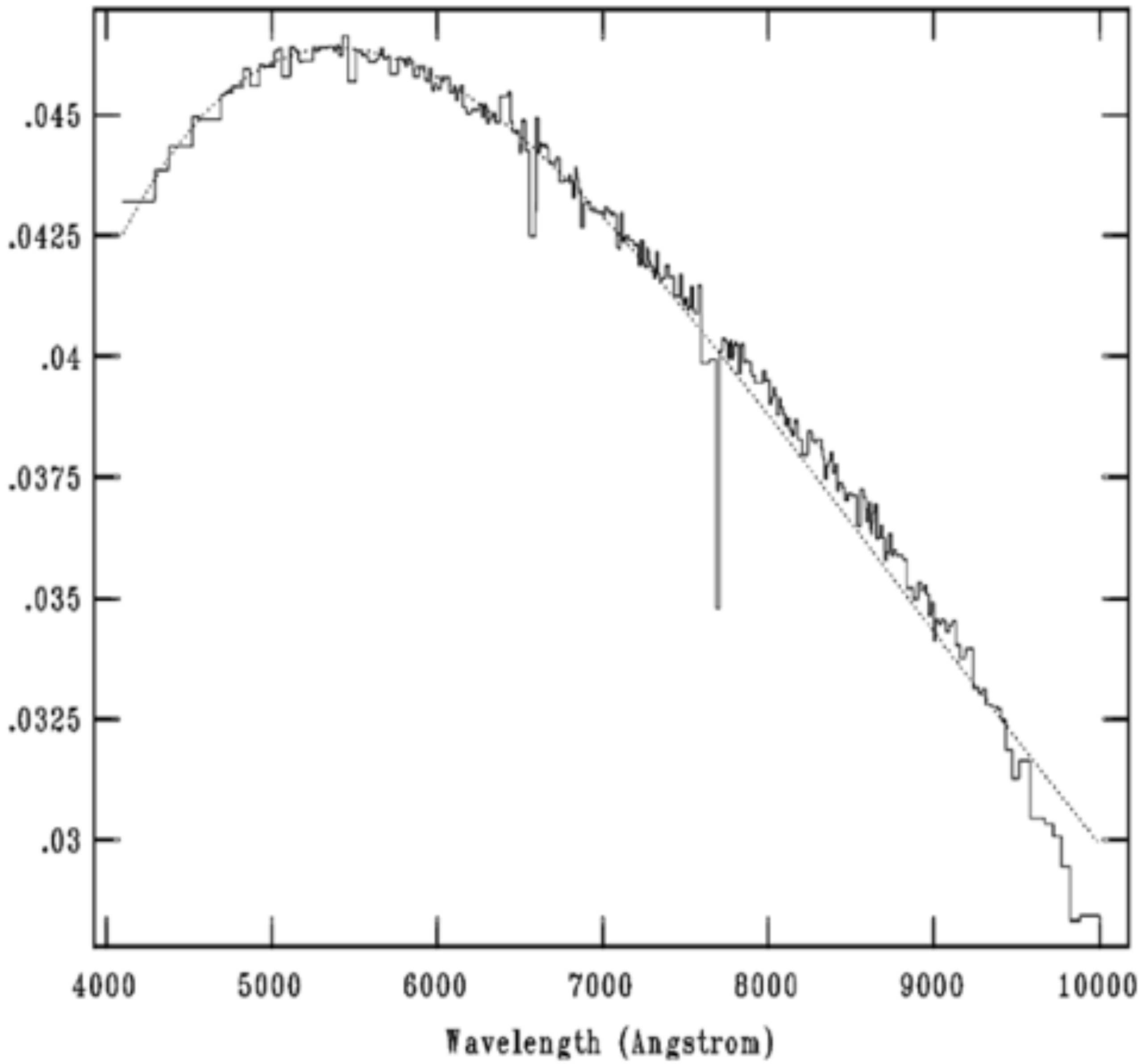
ABSTRACT

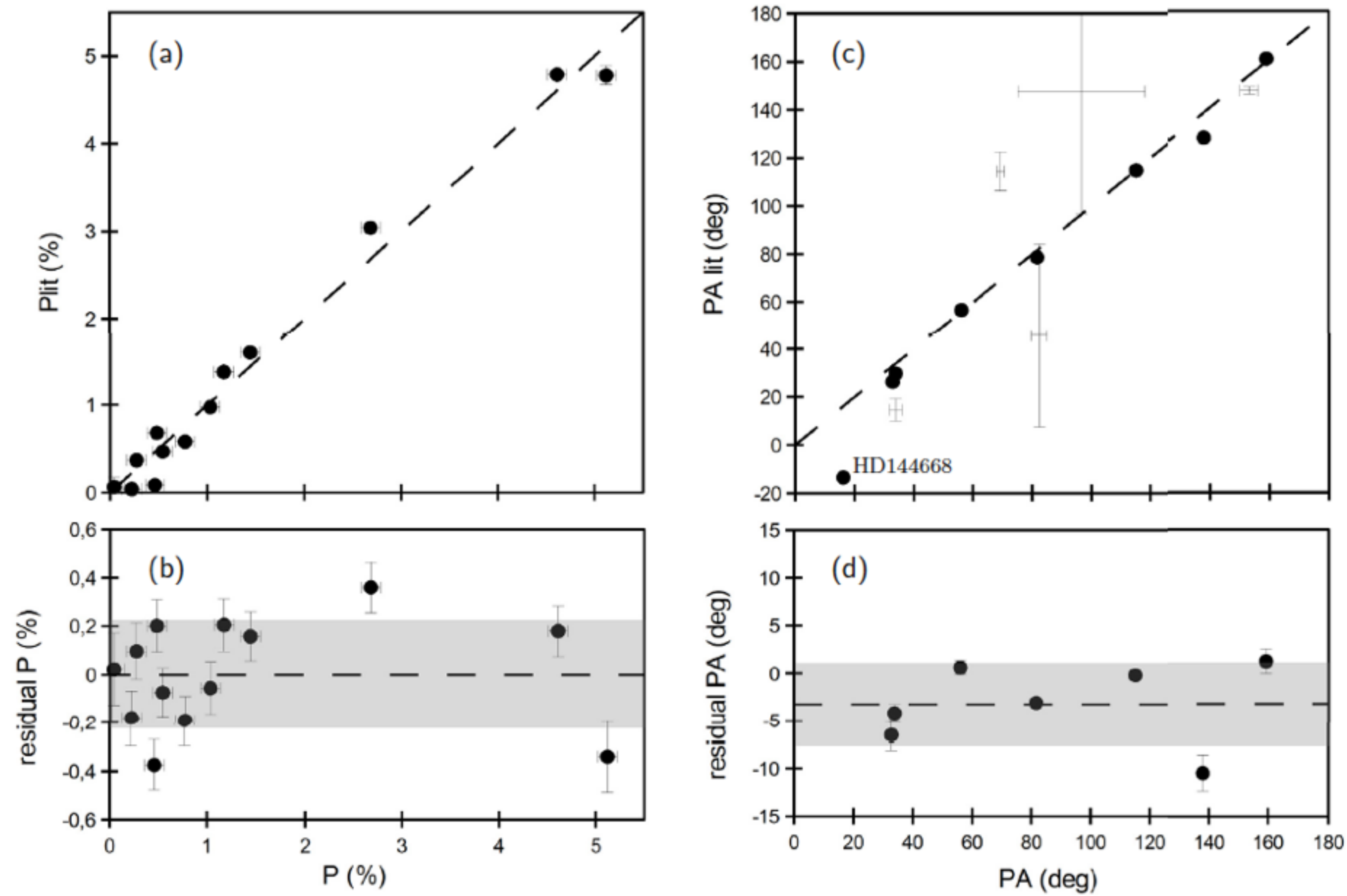
Aims. Our goal is to test the feasibility of obtaining accurate measurements of the continuum polarization from high-resolution spectra using the spectropolarimetric mode of ESPaDOnS.
Methods. We used the new pipeline OPERA to reduce recent and archived ESPaDOnS data. Several polarization standard stars 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

Polarização no contínuo






(a)
Plit (%)
(b)
residual P (%)
P (%)
(c)
PA lit (deg)
HD144668
(d)
residual PA (deg)
PA (deg)

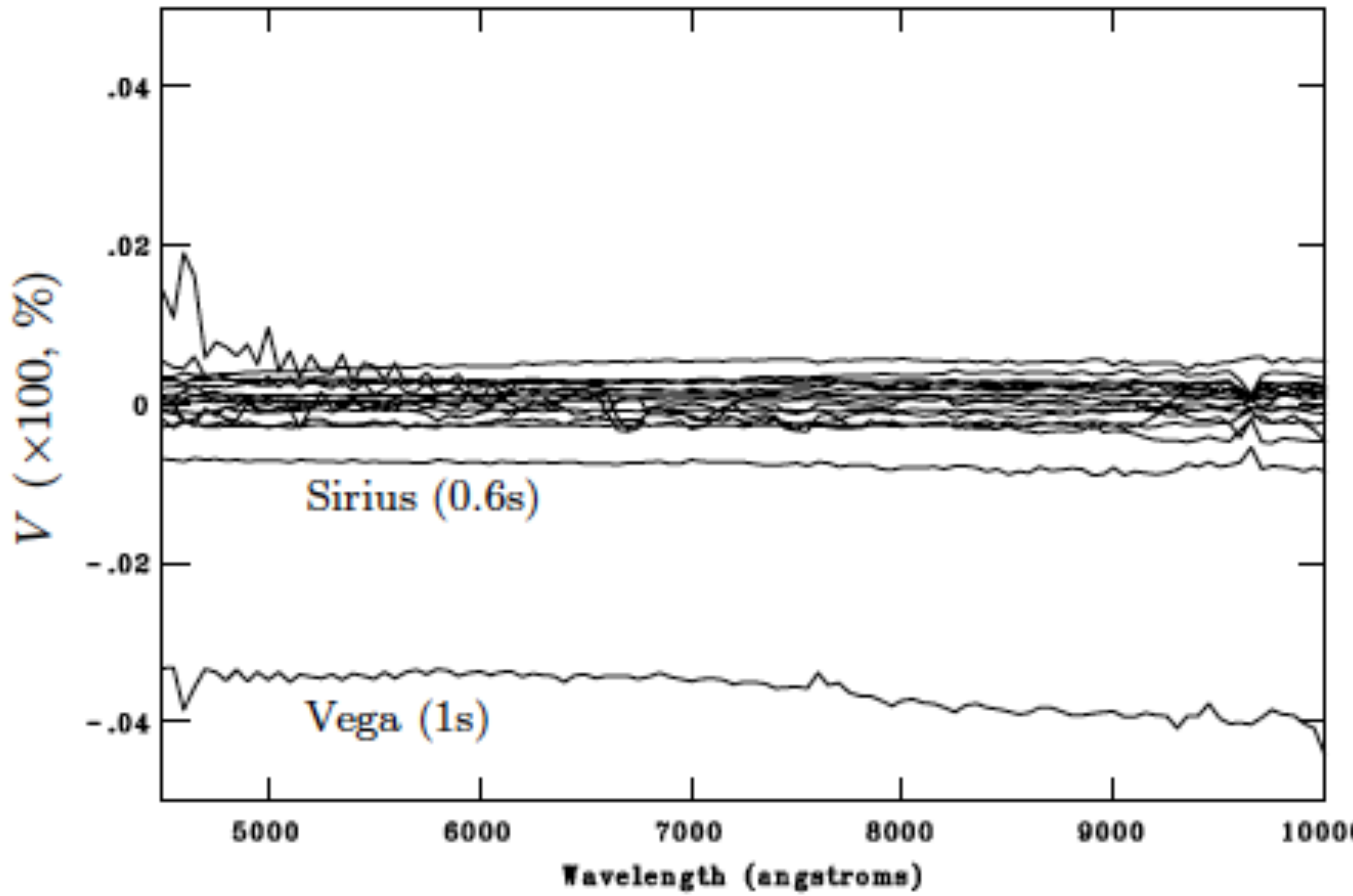
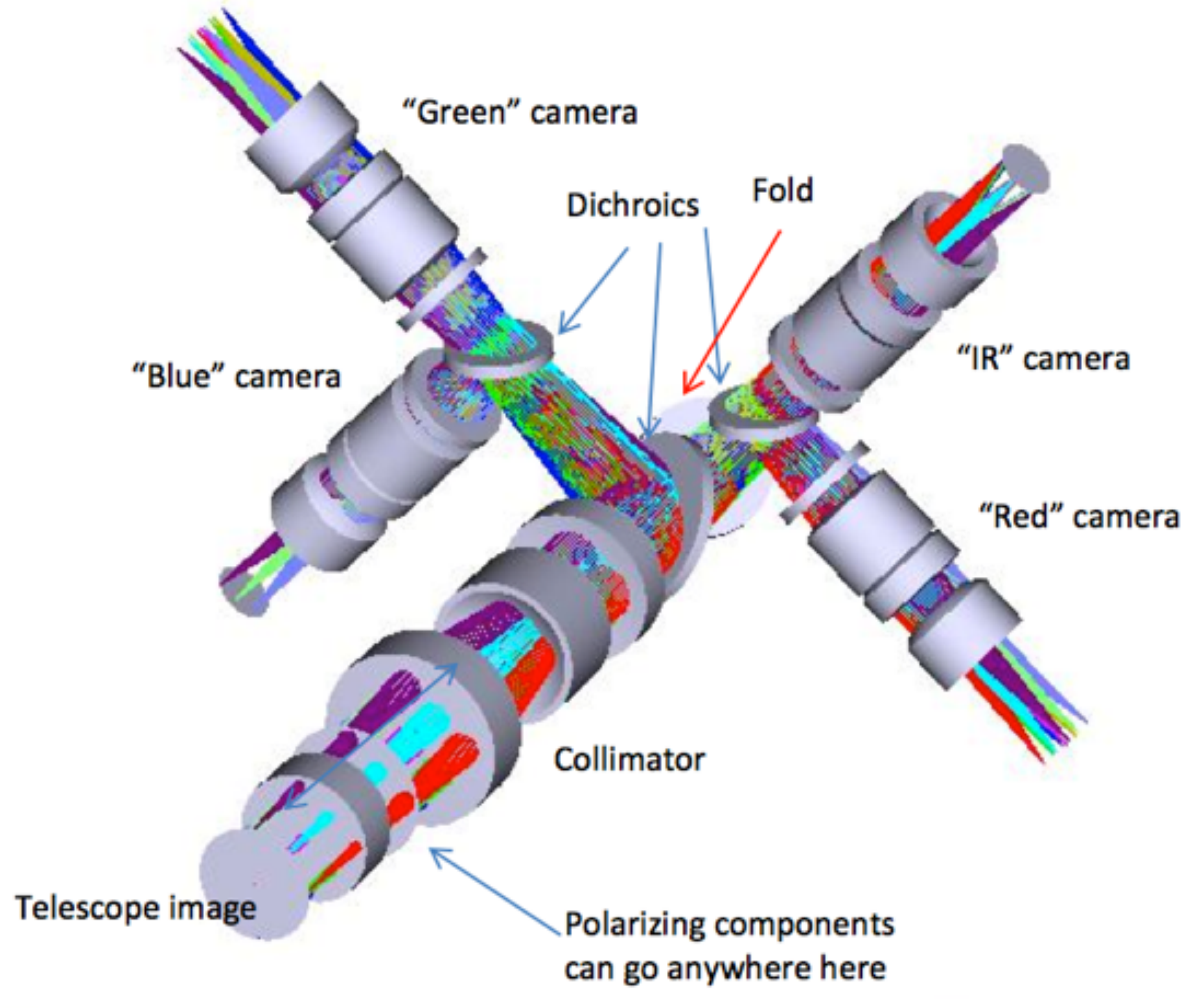


Fig. 12. Circular continuum polarization spectra of selected objects from the CFHT archive. Seventeen measurements are shown. The highest levels of V in two short exposures are indicated with the integration times in parenthesis.

SPARC4



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

SPARC4 - 2015

* Entregas
  - câmeras científicas
  - dicróicos

* Aquisições (em andamento)
  - INPE - Projeto de Vulto CEA/2015
    * colimador e câmera ópticas

Campo magnético interestelar

The Astrophysical Journal, 806:94 (19pp), 2015 June 10 doi:10.1088/0004-637X/806/1/94

A NEW OPTICAL POLARIZATION CATALOG FOR THE SMALL MAGELLANIC CLOUD: THE MAGNETIC FIELD STRUCTURE

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ABSTRACT

We present a new optical polarimetric catalog for the Small Magellanic Cloud (SMC). It contains a total of 7207 stars, located in the northeast (NE) and Wing sections of the SMC and part of the Magellanic Bridge. This new catalog is a significant improvement compared to previous polarimetric catalogs for the SMC. We used it to study the sky-projected interstellar magnetic field structure of the SMC. Three trends were observed for the ordered magnetic field direction at position angles (PAs) of $(65^\circ \pm 10^\circ)$, $(115^\circ \pm 10^\circ)$, and $(150^\circ \pm 10^\circ)$. Our results suggest the existence of an ordered magnetic field aligned with the Magellanic Bridge direction and SMC's Bar in the NE region, which have PAs roughly at 115°.4 and 45°, respectively. However, the overall magnetic field structure is fairly complex. The trends at 115° and 150° may be correlated with the SMC's bimodal structure, observed in Cepheids' distances and HI velocities. We derived a value of $B_{sky} = (0.947 \pm 0.079)\,\mu$G for the ordered sky-projected magnetic field, and $\delta B = (1.465 \pm 0.069)\,\mu$G for the turbulent magnetic field. This estimate of B_{sky} is significantly larger (by a factor of ~10) than the line of sight field derived from Faraday rotation observations, suggesting that most of the ordered field component is on the plane of the sky. A turbulent magnetic field stronger than the ordered field agrees with observed estimates for other irregular and spiral galaxies. For the SMC the $B_{sky}/\delta B$ ratio is closer to what is observed for our Galaxy than other irregular dwarf galaxies.

Key words: galaxies: ISM – Magellanic Clouds – magnetic fields – techniques: polarimetric

Supporting material: figure set, machine-readable tables

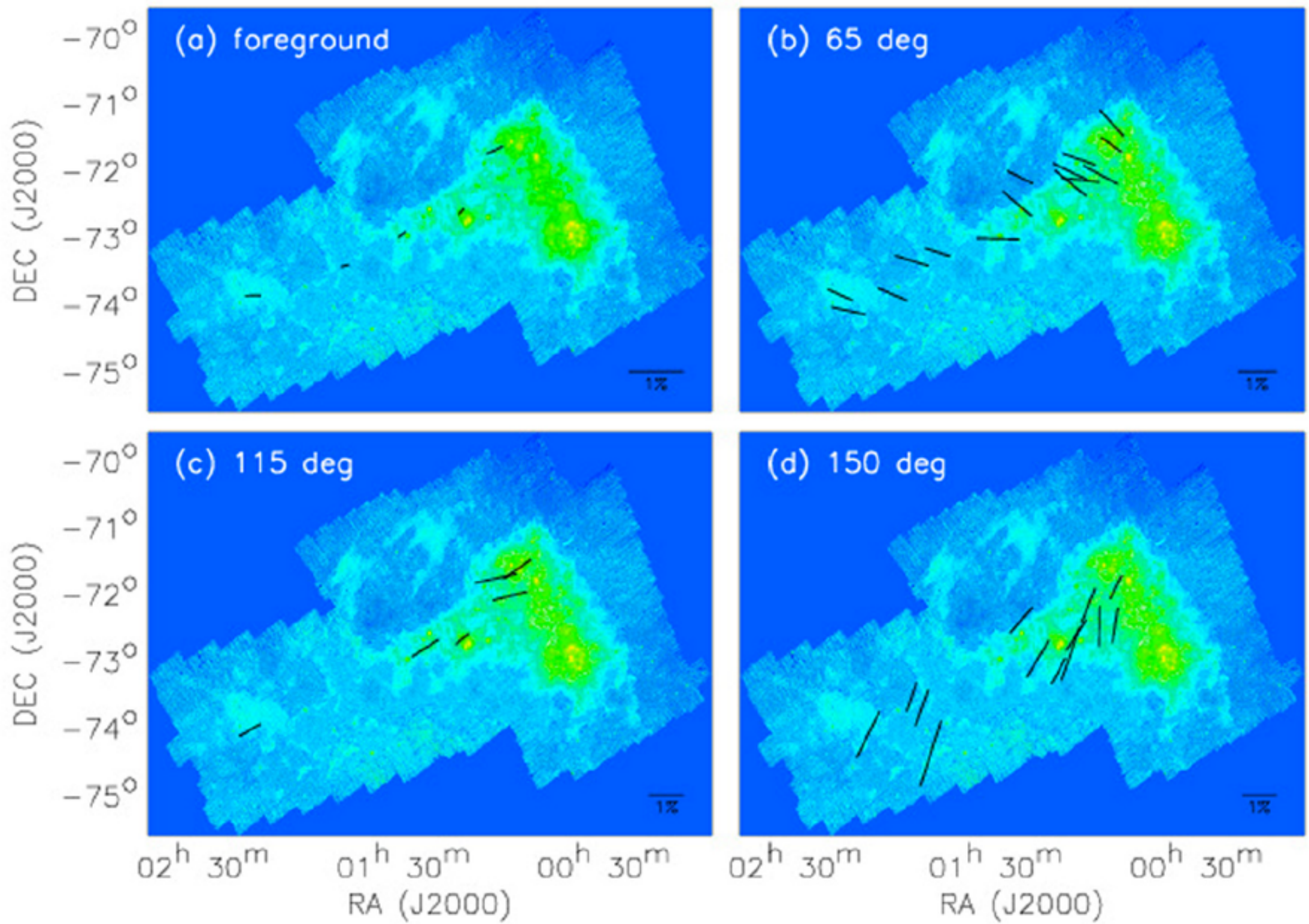

Figure 8. Polarization maps. Panel (a) shows a map of the foreground polarization from this work, panel (b) shows a map of the PDs in the range [40°.0–90°.0], panel (c) shows a map of the PDs in the range [90°.0–132°.5], and panel (d) shows a map of the PDs in the range [132°.5–185°.0]. The vectors are overlapped with a *Spitzer*/MIPS image at 160 μm (Gordon et al. 2011). The Magellanic Bridge stars in the lower left region of the maps and extends up to the LMC location.

Perspectivas 2016

* Submissão de 1 artigo em redação
    - quiçá redação de outro artigo...
* Início construção SPARC4?
* Aplicação do Cyclops em polares intermediárias
    - Doutorado da Isabel - Fapesp

Obrigada!