GEOS Groupe Européen d'Observation Stellaire

GEOS RR Lyr SURVEY

GEOS **RR Lyr** *Database*

operated by Jean-Louis Virlichie, Hervé Roy, Pierre Traverse — OBSERVATOIRE SADR

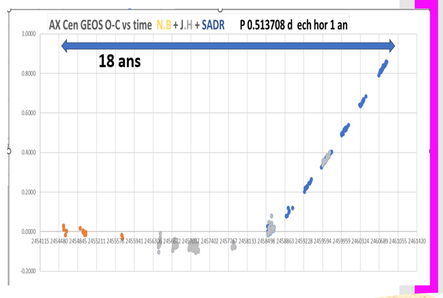
AX Cen a RR Lyrae variable star with strong Blazhko effect

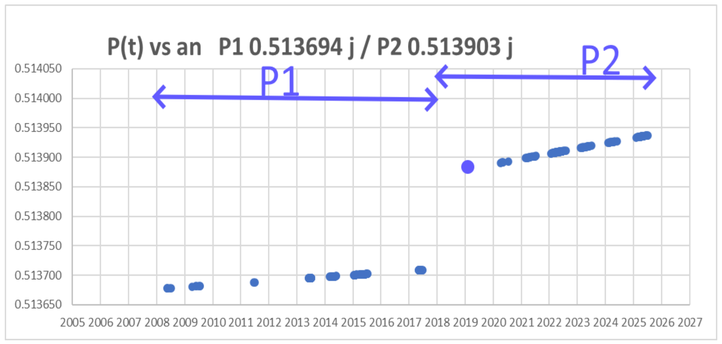
Traverse. P. [1,2] *; Virlichie. J-L.* [1,2] *; Roy. H.* [1,2] *; Le Borgne J-F* [1,3,4]
(1) GEOS, (2) SAF, (3) IRAP Observatoire Midi-Pyrénées, Toulouse, (4) Laboratoire d'Astrophysique de Marseille

GEMINI COOPÉRATION RONOMES PRO-AM — ProAm — SF2A Société Française d'Astronomie et d'Astrophysique — SAF

A period change in 2018

Period value found in many survey and databases: OMC, AAVSO, GCVS, GAIA DR2, GAIA DR3, OGLE IV, ASAS SN
and data from GEOS db, SADR and J. Hambsch observations
Based on FITS image from 2008 to 2026
A « jump » occured sometimes in 2018-2019 from pulsation period 0.5137 d to 0.5139 d
see Observed minus Calculated values of time at min mag (max luminosity), the change of slope is indicating a period value change, see under
Also the rate of variation of the period increased see under (TBC)



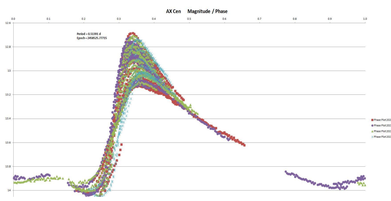


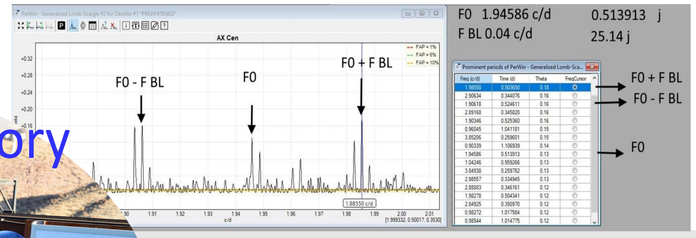
Data points folded per pulsation period 0.513d
Then modulation period 24.2 d

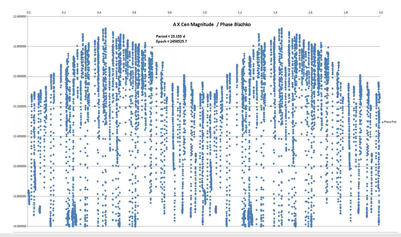
see GEOS NC1370 june 2025 JL Virlichie

The observations points, folded per pulsation period, show a strong modulation both in amplitude and phase (period); this is the Blazhko effect (S. Blazhko 1907)

The blazhko period can be determined by triplets around pulsation period, see under, by direct frequency measurement in Fourier analysis from HJD-mag time series or by magnitude or observed minus time of maximum light

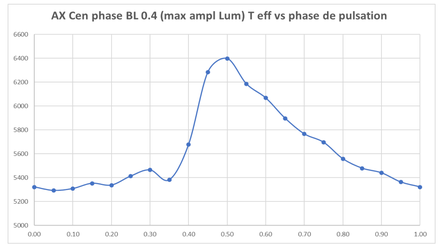


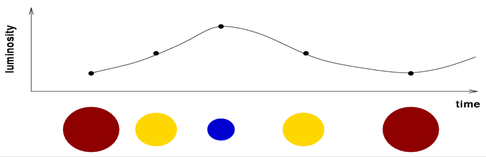




Astrophysics parameters: Fe/H, Teff, g, Luminosity

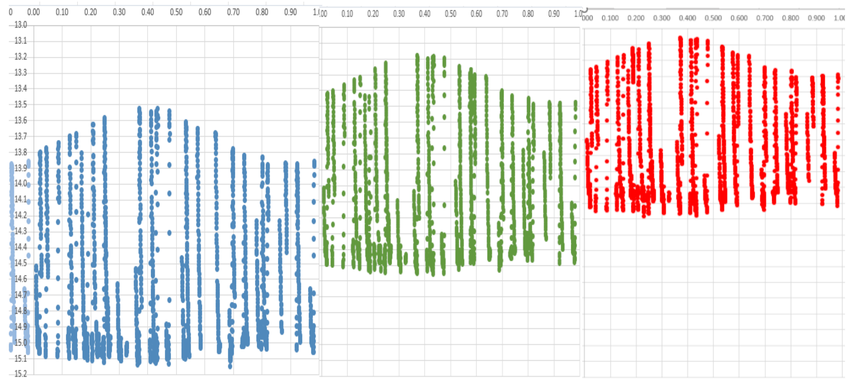
Fourier decomposition (order 10 for RRab) of light curve allow to find pertinent data of the shape of the light curve mainly amplitude A21 (A2/A1) and phase specificaly φ31 (φ3 – 3*φ1). Pro astronomers discovered, by statistics calculation, empirical relations that they calibrated with lots of data (survey).
See for example temperature evolution of RR Lyrae AX Cen atmosphere during the pulsation, here at Blazhko phase 0.4

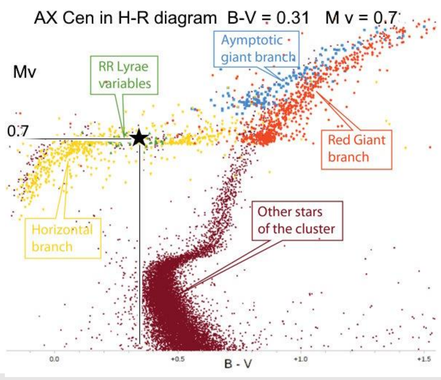




B, V and R band observation

Multi band observation allow to place the star in the H-R diagram
-B-V and V-R are positive
-Blue amplitude is greater than green one and green one is greater than red one
-RR Lyrae stars are both in Horizontal Branch and Instability Strip





Références et contacts

Bibliographie
Pierre Traverse: Ecole de Photométrie 2024; poster UV Hor a RR Lyrae star
J-L Virlichie: GEOS NC 1370 Temporal and frequency effects of the proximity of the RR Lyrae period to the half day
https://rr-lyr.irap.omp.eu/documents/GEOS_circulars/NC1370.pdf
GEOS https://geosastro.eu/
pierre.traverse@orange.fr