

# PHAROS Conference 2020: The multi-messenger physics and astrophysics of neutron stars



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## High-resolution phase coherent optical timing of the Vela pulsar and PSR J1023+0038 with Aqueye+ and Iqueye

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We present the results of an optical timing analysis of the Vela pulsar and the transitional millisecond pulsar PSR J1023+0038. The Vela pulsar was observed in 2009 with the fast photometer Iqueye mounted at the ESO 3.5 m New Technology Telescope (Chile). We determined an independent optical timing solution and the most detailed optical pulse profile of this pulsar available to date. The quality of the Iqueye data allowed us to determine the relative time of arrival of the radio-optical-gamma-ray peaks with an accuracy of a fraction of a millisecond. PSR J1023+0038 was recently observed with the fast photometer Aqueye+ mounted at the Asiago 1.8 m Copernicus telescope (Italy). We derive a long-base phase coherent timing solution based entirely on optical data and determine the rotational period with an accuracy of  $\sim 7 \times 10^{-15}$  s. In addition, we constrain the value of the frequency derivative of the pulsar.

**Author:** Dr BURTOVOI, Aleksandr (CISAS - University of Padova, INAF - Astronomical Observatory of Padova)

**Co-author:** Dr ZAMPIERI, Luca (INAF - Astronomical Observatory of Padova,)

**Presenter:** Dr BURTOVOI, Aleksandr (CISAS - University of Padova, INAF - Astronomical Observatory of Padova)

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