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Vela X-1 and sgHMXB: hydro driven hard X-rays

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The dynamic of the accretion of stellar wind on the pulsar in Vela X-1 is dominated by unstable hydrodynamical flows. INTEGRAL discovered off-states, 10^{37} erg/s flares, quasi-periodic oscillations and log normal flux distribution, which can all be reproduced by hydrodynamical simulations, revealing the complex motion of the bow shocks moving either towards or away from the neutron star. With the help of hydrodynamic simulations and hard X-ray observations can also be used to probe the scattering of hard X-ray photons on the stellar wind to determine the velocity and density profile of the wind very close to the surface of the supergiant companion. This provides a unique measurement of the early acceleration of stellar winds in massive stars, otherwise poorly constrained.

Author: MANOUSAKIS, Antonis

Co-author: WALTER, Roland (University of Geneva)

Presenter: MANOUSAKIS, Antonis

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