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A multi-wavelength perspective of millisecond pulsars in NGC 362

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It is well established that the frequent stellar dynamical interactions in the high-density globular cluster (GC) cores make them efficient factories of exotic objects, including **millisecond pulsars (MSPs)**. In fact, the number of MSPs per unit mass in the Galactic GC population is some 10^3 times larger than in the Galactic field.

As part of a large project that aims at exploiting the **synergy** between the last generation of high-resolution instruments for the identification and characterization of MSP in GCs, I will present recent results obtained for the old GC **NGC362**.

One of the key innovative points of this analysis is the adoption of a **multi-instrument** and **multi-wavelength** approach that makes use of multi-epoch optical and UV **Hubble Space Telescope** ACS and WFC3 data, NIR **Gemini Multi-conjugate Adaptive Optics** system images and information provided by **X-ray observations**.

With such a huge and complex database, we were able to identify more than **50 optical counterparts** to X-ray sources, revealing a rich and diverse population of interactive binaries in this cluster.

Interestingly, **more than 10%** of these sources show positions in the color-magnitude diagram and peculiar light curves compatible with the typical signatures of MSP companions known in the literature. In particular, one counterpart exhibits a typical variability and period expected for a **Black Widow system**.

These potential counterparts will be used to feed an ongoing radio **MeerKAT** data analysis to help constrain the parameters, such as the position, of interesting radio sources.

The results of this work demonstrate the importance of the adoption of a multi-instrument and multi-band approach for a comprehensive characterization of MSPs. In turn, this kind of analysis will pave the way for future scientific applications allowing the selection of the most promising targets for the **next generation telescopes**, such as ELT and SKA.

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