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## Black Holes & Stars : an intriguing dynamical relationship

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The dynamical interplay between stars and stellar mass black holes (BHs) in star clusters can lead to a broad spectrum of outcomes which range from peculiar binary systems, as those recently discovered with the astrometric Gaia measurements (Gaia DR3), to micro-tidal disruption events. The former are the first dormant (i.e. X-ray silent), BH-star binaries discovered with Gaia DR3. The latter are multi-messenger transients, predicted to be detected by next generation gravitational waves detectors, that occur when a star that passes closely to a BH is disrupted and its debris create an observable (i.e. X-ray-UV-optical) accretion disc around the BH. In this talk I will give an overview on these topics introducing my project which aims to investigate bh-star dynamical interactions with N-body simulations. My results will be crucial to give an astrophysical interpretation to the data that will come with next transient surveys and astrometric measurement with Gaia DR4.

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