Modelling bow-shock waves as tracers of the environment and stellar outflows near the Galactic Centre

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In the center of the Milky Way, Sagittarius A* is a prototypical example of an inactive galactic nucleus that harbours a supermassive compact dark object in the center (Eckart+2017). Its low luminosity has been attributed to an extremely small and inefficient level of accretion activity. Despite that various structures emerge within the sphere of black hole influence. A dense nuclear cluster surrounds the nucleus and vigorous winds of massive OB/WR stars interact with the overall inward advection of rarefied gas, whereas further out an outflow occurs.

We model the occurrence, morphology and geometrical properties of bow shocks that can develop near fast moving stars with emerging winds. We show how the shape and orientation of the bow shocks changes with the distance from the centre (Zajaček+2016, MNRAS) and in the region where the bulk motion of the flow changes from inflow to outflow (Štofanová 2016, BSc. Thesis). Under suitable circumstances, a large and dense bow shock structure can be detected in infrared domain and their properties can trace the environment of the Galactic center. On the other hand, if the density of the ambient medium is determined from mm/radio observations (Kunneriath+2012, Moser+2017), bow shocks constrain mass-loss rates of massive OB/WR stars.