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Interaction between a Pulsar Wind and a Be Star in the Gamma-ray Binary HESS J0632+057

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Gamma-ray binaries are binaries with peak energy above 1 MeV. Currently, there are three such systems with a Be star and two with an O-type main-sequence star. For those with an unknown nature of compact object, two scenarios, the pulsar wind scenario and the microquasar scenario, have been proposed to explain the origin of high energy emission. HESS J0632+057 is a recently established gamma-ray binary composed of a Be star and an unknown nature of compact object in a wide ($P_{\rm orb} \sim 315\,{\rm d}$) and highly eccentric ($e = 0.83$) orbit. It exhibits two X-ray outbursts per orbit, both of which occur when the compact object is far from periastron, and the primary, pre-apastron outburst is followed by a deep minimum. In this talk, we report on the results from 3D SPH simulations of the interaction between the compact object and the circumstellar environment of the Be star of HESS J0632+057, based on the pulsar wind scenario. We assume that the Be disk is misaligned with the orbital plane and rotate in either the prograde or retrograde direction. We find that for relatively low spin down luminosity ($L_{\rm sd} \lesssim 10^{35}\,{\rm erg\,s^{-1}}$), there are orbital phases, at which the pulsar wind is terminated by Be-disk gas over a large solid angle. The non-thermal emission is likely strong at these phases. We also find that at phases around periastron, the pulsar wind is strongly suppressed by accreting flows towards the pulsar. This feature explains why the system is in quiescence around periastron.