

## Interaction between the Be star and the compact companion in TeV gamma-ray binaries

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TeV gamma-ray binaries are a recently established, rare class of gamma-ray sources: Only three binaries (PSR B1259-63, LS I+61 303, and LS 5039) and one binary candidate (HESS J0632+057) show persistent TeV ( $= 10^{12}$  eV) emission. Interestingly, all but one (LS 5039) have Be stars, which are early-type stars with a polar wind and a dense equatorial disk. Thus, the interaction between the Be-star envelope and the compact companion is a key to modeling these systems and understanding physics of high energy emission.

In this paper, we report on the results from 3-D SPH simulations of TeV binaries with Be stars. Since there is only one TeV binary (PSR B1259-63) where the nature of the compact companion has been established, we mainly focus on this Be-pulsar system with a highly eccentric ( $e = 0.87$ ), 3.4yr orbit. Using simulations of PSR B1259-63 around periastron, we find that the pulsar wind dominates the Be wind and strips off an outer part of the Be disk, causing a strongly asymmetric, phase-dependent structure of the circumstellar material around the Be star. Such a large modulation may be detected by optical, IR, and/or UV observations around the next periastron, which will take place on 14 December 2010. We will also discuss the results from numerical simulations for both the colliding wind and accretion/ejection models of LS I+61 303, for which the nature of the compact companion is not yet known.