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Modeling particle acceleration in the remnant of SN1987A

Supernova remnants are still the best candidates for for the origin of the majority of the Galactic cosmic-rays - the charged particles, that constantly bombard Earth from outer space. Despite the fact that our understanding of the acceleration process that energizes this cosmic-rays greatly improved since it first proposal in the middle of the last century, many details of the acceleration process are still poorly understood.

The remnant of the first detected Supernova in 1987 - SN 1987A - occurred in the large Magellanic cloud and was the closest Supernova to Earth in the last five centuries. As a consequence, its remnant is one of the best-observed objects in astronomical history. Despite all efforts, so far, no gamma-ray emission has been detected form SN 987A, which would be indicative of the particle acceleration happening in the object.

The aim of the project is to use state-of-the-art models for the medium around the progenitor-star of the explosion, to model the evolution of the shock-fronts in the object, the particle acceleration and ultimately the particles' emission. It will be a first attempt to model the acceleration in a peudo-3d model, assuming piecewise spherical symmetry, producing high-resolution emission maps in different wavelengths of the thermal and non-thermal emission that can be compared to rich observational dataset of this object.

Group

THAT

Project Category

C3. Theory of astroparticle physics

Special Qualifications

Experience with python would be highly beneficial

DESY Site

Zeuthen

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