PULSAR WINDS IN SUPERNOVA REMNANTS: HYDRODYNAMICAL SIMULATIONS

E. van der Swaluw
Dublin Institute for Advanced Studies (swaluw@cp.dias.ie/Fax:+353-1-6621477)

I will consider the interaction of a pulsar wind with its associated supernova remnant by presenting results from (magneto-)hydrodynamical simulations. The pulsar wind blows a bubble (pulsar wind nebula) into the expanding supernova remnant. I will consider the scenario for which the pulsar gains a kick velocity at its birth event. This yields a pulsar wind nebula which is close to the center of the supernova remnant at early stages (~100-1,000 years) and gets excentric at later stages (~1000-10,000 years) of its evolution. Ultimately the pulsar wind will break through the shell of the supernova remnant.

The above scenario is investigated in detail by performing (magneto-) hydrodynamical simulations. These results will be presented, where I will put an emphasis on the evolutionary influence of the kick velocity of the pulsar, the reverse shock of the supernova remnant and the toroidal magnetic fields inside the pulsar wind nebula. The results from these simulations show a diversity of morphologies of pulsar wind nebulae, which can be used to get a better understanding of the evolutionary stage of observed composite remnants.