

I visited the Max-Planck-Institut for Astrophysics in Garching during the period of October 26 to November 2, 2014.

During my visit I had a close collaboration mainly with Dr. Michael Gabler. The project was a natural continuation of our collaboration that started a few years ago, with Dr. Gabler's PhD thesis at MPA (we have already a large number of joint publications).

In particular, the project I worked on with Dr. Gabler concerns the completion of model for the X-ray modulations seen after burst activity in several soft-gamma-ray repeaters. In the past, we had developed a model for possible internal, magnetoelastic, axisymmetric torsional oscillations. Recently, we had shown how these oscillations can modulate the magnetic field at the surface of the star, as well as in the magnetosphere. What remains to be completed (and this was the focus of our collaboration during my stay at MPA) is the modulation of an X-ray emission mechanism in the magnetosphere.

Dr. Gabler has already presented an initial model for the X-ray modulation in his PhD thesis, which was also presented in a recent joint publication in a proceedings volume. The mechanism is based on the assumption of the resonant cyclotron scattering. What needs to be improved in this model is the initial distribution of particles in the magnetosphere. Dr. Gabler has worked in the last months with Dr. Pablo Cerda-Duran of the university of Valencia in order to arrive at a more realistic distribution. On the other hand, my new PhD student at the Aristotle University of Thessaloniki (Nikolaos Tryfonidis) has written a particle-in-cell (PIC) code for simulating the dynamics of plasmas.

During my week-long stay at MPA I collaborated with Dr. Gabler in setting up a first model for the distribution of particles along individual magnetic field lines, which can be simulated with N. Tryfonidis' PIC code. After several discussions, we arrived at a particular configuration as a starting point. To enable this computation, Dr. Gabler gave me a code he has for computing the quasistationary configuration of twisted magnetospheres.

Upon my return to the Aristotle University of Thessaloniki, I advised my PhD student on setting up the configuration that I agreed with Dr. Gabler in his PIC code and in the next few weeks we expect to have the first results, which will allow us a direct comparison with the approach by Gabler and Cerda-Duran. Within the next months, I expect a first publication in which the STSM of the COST action will be acknowledged.

Apart from the collaboration with Dr. Gabler (which was the main aim of the STSM) I also had the opportunity to work closely with Dr. Thomas Janka on an ongoing joint project regarding the post-merger gravitational wave emission in binary neutron star mergers, as well as with Dr. Pedro Montero on an ongoing project regarding the axisymmetric and non-axisymmetric instabilities in self-gravitating accretion tori with non-constant specific angular momentum distributions around black holes. I expect publications from both of these projects in the next months, in which the STSM of the COST action will also be acknowledged.

Best regards,



Nikolaos Stergioulas