

REPORT ON STSM

PROPOSAL TITLE:

Timing properties of accretion onto highly magnetized neutron stars

Description of purpose, results and plans

Detailed investigation of fast aperiodic variability of accreting magnetized neutron stars (NSs) can potentially give an important information about interaction between accretion flow and NS magnetosphere. The basic ideas here are well known, but further progress in this field requires detailed analysis of observational data. The global aim of the proposed project is try to explain and model the basic features of fast variability of accretion NSs which are imprinted in a power spectrum density (for more details see the proposal for STSM).

Thanks to intensive collaborative work with Dr. Sergey S. Tsygankov, who is an expert in X-ray data analysis and X-ray pulsars (XRP), interesting results were achieved during my visit to Tuorla observatory, University of Turku (Finland) from 1 to 14 August. We have applied a model of propagating accretion fluctuations (Lyubarskii 1997) to accretion disc in NS binaries, where the accretion flow is interrupted by strong magnetosphere of a NS. We have take into account that the diffusion process in such systems can be well described by solutions obtained by Tanaka 2011. We have taken into account the idea that rotating magnetosphere can produce broad band variability at the inner region of the disc, which properties depend on the mass accretion rate. It was possible to include the simplified model of the produced variability into diffusion model, construct theoretical PSD and explain a few features which arise in PSD of known XRP during their outbursts.

We believe that further investigation in this field will be important for our understanding of nature of accreting magnetized NSs and detailed models will put strong constrains on the current theories. At the moment we are working on this project separately in own home institutes. Main paper is planned to be submitted to refereed journal this year. A few sub-projects have arised from the main project and results will be published later.

References

- Lyubarskii Y., 1997, MNRAS, 292, 647
- Tanaka T., 2011, MNRAS, 410, 1007