REPORT ON STSM

PROPOSAL TITLE:
Dynamics of the accretion flow in case of extremely bright X-ray pulsars

Description of purpose, results and plans

The global aim of the proposed project is to construct a model of the accretion flow in a region between the accretion disc inner radius and neutron star (NS) surface (for more details see the proposal for STSM). To achieve the declared goal of the project one have to analyze an influence of radiation pressure on the flow dynamics not only at the very vicinity of NS surface, but also at some distance from it.

Thanks to intensive collaborative work with Dr. Valery F. Suleimanov, who is an expert in radiative transfer theory and NSs atmosphere models, interesting results were achieved during my visit to the University of Tuebingen (Germany) from 1 to 12 March. We have constructed a model of interaction between radiation and accreting matter due to the resonant Compton scattering. The Doppler redshift due to matter deceleration was taken into account and was proved to be crucially important. We have also analyzed an influence of non-resonant scattering in strong magnetic field. The results are applicable for the regions close to the NS surface and distant from it. The final conclusions will be important for highly magnetized neutron stars, which can reach extremely bright luminosity state and where the resonant Compton scattering takes place mainly on distance from the stellar surface.

Now we are working on this project separately in own home institutes. Main paper is planned to be published this year. Also a few sub-projects have already arised from the main project and results will be published later.