

## Spectra of accretion columns in X-ray pulsars

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We discuss recent spectral correlations with changing mass accretion rate found in transient X-ray pulsars, including the spectral hardness increase and saturation in high-luminosity sources and cyclotron resonant scattering feature (CRSF) energy increase with X-ray luminosity in low-luminosity sources. In high-luminosity pulsars, 2D calculations of radiation-dominated accretion columns with Compton-saturated sidewall spectra with taking into account of reflection from the neutron star (NS) surface are able to explain the observed spectral hardness ratio correlations [1]. In low-luminosity pulsars, the X-ray spectrum is produced in semi-transparent plasma behind collisionless shock above the NS surface, and CRSF is formed in a resonant layer in inhomogeneous magnetic field of NS. This physical model can explain the observed CRSF correlations, including the energy dependence, line width and depth changes with X-ray luminosity. We apply this model to the recent analysis of RXTE observations of GX 304-1 [2] and NuSTAR observations of Cep X-4 [3].

## References

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