The correlation between the magnetic field strengths and X-ray spectra of O-type stars

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Massive hot stars are progenitors of neutron stars. If we know the nature of O-stars in detail we can understand the neutron stars evolution. Many of High massive X-ray binaries (HMXB) consists of OB-star and a neutron star. Nowadays it is considered that the X-ray emission of O-type stars formed in a collision of stellar winds in binary systems or as a result of heating of the matter of stellar wind by shock waves of the single O-type stars [1]. X-ray emission formation in spectra of magnetic O-type stars can be described in a framework of Magnetically confined wind-shock model (MCWS) [2, 3]. In this model the stellar wind flows move along the magnetic field lines to the magnetic equator, where they collide and form a shock wave. The X-ray emission is formed in the hot gas heated by this shock. In addition, a circumstellar disk can be formed in the area of the magnetic equator. From this paradigm derives that spectrum hardness must increase with such stellar parameters, as magnetic field, terminal velocity and mass loss rate. The aim of our work is studying if there is a dependence of X-ray spectra hardness of O stars on these parameters. We analyzed the archival X-ray observations of 20 O-stars and HMXB obtained by XMM-Newton from 2000 to 2015. We extracted spectra using the SAS 14.0 software. As a result of our analysis we can made a premilarity conclusion about connection between X-ray spectrum hardness and other parameters of O-stars and the HMXB.

References

[1] V. Petit et al, *Geology & Astronomy*, 302, 330 (2014)
[2] J. Babel & T. Montmerle, *AA* Vol. 323. P. 121-138 (1997)
[3] A ud-Doula & S. P. Owocki *ApJ* 576, 413 (2002)

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