

What can we learn about stellar magnetization by studying unique spin evolution of the X-ray pulsar OAO 1657-415

N. R. Ikhsanov^{1,2,3*}, V. Yu. Kim¹

¹Pulkovo Observatory, St. Petersburg, Russia

²Saint-Petersburg State University, St. Petersburg, Russia

³Special Astrophysical Observatory, Nizhnij Arkhyz, Russia

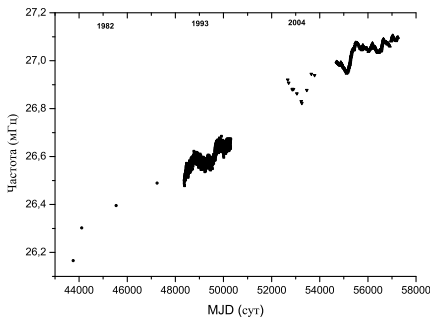


Figure 1: Spin evolution of OAO 1657-415

component is relatively slow and magnetized. Considering the neutron star as a probe we find that the velocity of the wind in the orbital plane at the distance of binary separation does not exceed 300 km/s and the magnetic field in the wind from which the neutron star captures material lies in the interval 20 – 70 mG. Finally, the observed spin evolution of the pulsar suggests that the stellar wind velocity may decrease as the massive star is approaching the final stage of its evolution.

The persistent X-ray pulsar OAO 1657-415 is associated with a wind-fed High Mass X-ray Binary and shows a peculiar spin evolution. Its basic parameters are well studied including the magnetic field of the neutron star which is measured through observations of the cyclotron line. The pulsar is observed to experience a regular long-term spin-up superposed with chaotic spin-up/spin-down events during which its period changes at a very high rate. According to our analysis such behavior can be expected if the stellar wind of the massive

*E-mail: ikhsanov@gao.spb.ru