
Stellar ejecta from falling comet-like bodies: young stars

Subhon Ibadov*^{1,2}

¹Moscow State University, Sternberg Astronomical Institute (MSU SAI) – Moscow 119991, Russia

²Institute of Astrophysics, Tajik Academy of Sciences (IA TAS) – Dushanbe 734042, Tajikistan

Abstract

High-resolution spectral observations of young stars with dense protoplanetary discs like Beta Pictoris led to discovery of variable emission lines of metal atoms, Na, Fe etc., that indicate the presence of fluxes of comet-like evaporating bodies falling onto the stars, FEBs. Assuming the presence of stellar atmospheres similar to the solar atmosphere, we show that some FEBs passing through the stellar chromosphere and photosphere will be accompanied by generation of stellar photospheric ejecta due to impulse production of high-temperature plasma in the relatively very thin sub-photosphere layer. Impulse, explosive character of the process is connected with high-velocity irradiation of the falling body by atmospheric particles resulting fully mechanical crushing of the body by aerodynamic pressure within chromosphere, transversal expansion of the crushed mass under the action of pressure gradient on the frontal surface of the body, sharp aerodynamic deceleration of the flattening body in the sub-photosphere layer.

Keywords: stellar ejecta, falling comet, like bodies, young stars

*Speaker