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EMISSION AND ABSORPTION LINE PROFILES FROM SUPERNOVA ENVELOPES

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Abstract. A supernova ejects a massive envelope with ballistic velocities approximately one tenth the speed of light or more. In the early "photospheric" phase one sees either normal very broadened absorption lines or P Cygni lines only a fraction of which are uncontaminated by line blending. Emission lines in the "nebular" phase are more amenable to interpretation. In some cases lines are also seen formed in the circumstellar material blown from the star prior to the explosion of the supernova. The absorption lines in the photospheric phase have been used to map the velocity structure, the mass of material above the photosphere and the stratification of various elements in the envelope. Emission lines especially when the envelope is optically thin, allow one to probe velocity structure, the distribution of important elements such as oxygen, and even the distribution of the radioactive species such as Ni^{56} which are the source of heating and excitation, and also the total mass of elements that are emitting those lines. Emission line profiles have proved to be clear indicators of the formation and presence of dust in supernova envelopes. A study of line profiles of gas in the circumstellar material provides estimates of mass loss rates, total masses and estimates of progenitor star mass.

Invited lecture

THE INFLUENCE OF SOME NON-SYMMETRIC ION-ATOM RADIATIVE COLLISIONS ON THE OPACITY OF STAR ATMOSPHERES

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Abstract. The ion-atom radiative collisions, as a factor which influences the optical characteristics of star atmospheres, were considered in several previous papers. It was shown that the most ignificant role is played by the processes of radiative charge exchange and photoassociative processes in $H^+ + H$ and $He^+ + He$ collisions. However, the star atmospheres are the example of chemically heterogeneous plasmas par exelence, hence the main task of this work is to investigate some of non-symmetrical radiative ion-atom collisional processes, which may occur in such plasmas. The influence of absorption processes in $He + H^+$ and $H + Na^+$ collisions on the opacity of solar photosphere, as well as the influence of $He + H^+$ on the opacity of some of DB white dwarfs, will be presented in this work.