# Simulations of Radiative Shocked YSO Jets: Time-dependent Ionization and Cooling

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Our purpose in the framework of the JETSET project is to perform realistic simulations of astrophysical jets, in particular YSO jets. The MHD simulation code we use (Pluto), is developed and maintained at the Turin University by A. Mignone. We developed a new cooling function which greatly improves over the rather simplified implementation of Raymond's algorithm (1992). The cooling function is valid in the following plasma conditions: temperatures between 2,000 and 200,000 K, particle number densities of 1 - $10^5$ $cm^{-3}$ and solar element abundances, a range particularly suitable for our applications. The cooling model accounts for the evolution of the following ion species: H, He I and II, C I to V, N I to V, O I to V, Ne I to V, S I to V. These species should give a good approximation of the cooling for the above conditions (see also Raga et al. 1997). Non-equilibrium ionization fractions are computed at runtime. The ionization balance is first computed in equilibrium conditions, and used as initial condition for the MHD simulation.