ID de Contribution: **27** Type: **Non spécifié**

An energy integral for non polytropic astrophysical winds and jets.

mardi 22 mai 2018 11:15 (20 minutes)

A criterion is derived for distinguishing if a rotating hydrodynamic outflow emerging from the atmosphere and the gravitational well of a central object obtains a radial (wind) or cylindrical (jet) asymptotical shape. Quasi-analytical solutions are obtained via a nonlinear separation of the variables, which are the spherical distance and the mass flux function, in the relevant physical quantities. Attention is focused on the streamline shape which is calculated exactly and self consistently throughout the outflow to formulate the criterion. It is concluded that in such hydrodynamic outflows their asymptotical shape is conical in the form of a non collimated wind, unless a suitable external pressure distribution is applied laterally to push the outflow towards the symmetry axis and thus obtain a collimated jet. This last situation is rather unlikely to happen in most environments, and thus the natural outcome is a wind rather than a jet. This study is complementary to the MHD energetic criterion developed by Sauty & Tsinganos (1994), wherein a similar magnetized outflow from efficient magnetic rotators obtains either cylindrical asymptotics via the magnetic hoop stresses, and/or a suitable external pressure gradient, or, radial asymptotics from inefficient magnetic rotators. Our results point towards the general conclusion that collimated astrophysical outflows from young stellar objects, or, AGNs are inevitably magnetically collimated. Without such magnetic confinement in efficient magnetic rotators, those outflows would have been radial, as is the case of the solar wind. Therefore, the magnetic field is the key factor for collimation of astrophysical outflows in the widespread phenomenon of astrophysical jets and winds, which without sufficiently strong azimuthal magnetic fields and fast rotaion would have been uncollimated as winds

Contribution

Talk

Author: Prof. TSINGANOS, KANARIS (UNIVERSITY OF ATHENS)

Co-auteurs: SAUTY, Christophe (Observatoire de Paris); M. CHANTRY, Loic (Observatoire de Paris); M. DAMOULAKIS, Michael (University of Athens); Prof. VLAHAKIS, Nektarios (University of Athens); Dr CAYATTE, Veronique (Observatoire de Paris)

Orateur: Prof. TSINGANOS, KANARIS (UNIVERSITY OF ATHENS)

Classification de Session: S1 Theory and models