BIPOLAR FLOWS DURING EARLY AND LATE PHASES OF STAR EVOLUTION

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Abstract. A mechanism for bipolar flows during early and late phases of star evolution is given, based on recently detected cold dark matter .

Key words: Bipolar Flows – Dark Matter

1. Introduction

Bipolar molecular flows have been observed as a characteristic phenomenon of star formation [LADA, 1990], as well as of the end phase of stellar evolution [STAUDE, 1979]. Even though bipolar flows seem to be essential for star formation, the precise nature of the engine that drives the intense molecular outflows with velocities between 10 and > 100 km/s has remained uncertain [LADA, 1990].

2. Consequences from recently detected cold dark matter

Recently, we have announced the experimental verification of a form of non-baryonic, cold dark matter [VOLKAMER, 1992]. This form of matter was disclosed from apparent violations of the law of conservation of mass in thermodynamically closed systems in which chemical (repeating a test from LANDOLT, 1908, in which metallic silver is generated from homogeneous solutions) and biochemical reactions were occuring, as well as in purely physical systems, including combinations between these systems. The free quanta of this form of matter show two forms of interaction with normal matter: a gravitational and a so far unknown "topological", i.e. form-specific, one at phase boundaries, as can be deduced from the experiments. The gravitationally bound, stationary field of this kind of matter around a star's center of gravity can be described by quantum mechanical formalisms leading to a structure as shown schematically in Fig. 1, where the star is placed as a point like object at the center of the structure. Numerical simulations show, after adjustment of, in principle, one parameter (a new quantum of action $A >> h$ for this kind of dark matter), that from the quantum mechanical densities of the ring shaped orbital of dark matter (which is expected to determine the distribution of normal matter in the circumstellar ring) the exact masses of the planets in the solar system can be predicted [VOLKAMER, 1981].

In addition, due to the orbital lobes of dark matter, existing perpendicular to the ring, gravitational acceleration of normal matter is predicted at certain locations (Fig. 1, dotted line and black arrows and Fig. 2) in two opposite outward directions, as computer simulations show. This leads to the formation of gravitationally driven bipolar flows, ranging from the lower parts of the lobes (as observed, not from the surface of the central star) outward, to their centers of mass during star formation and also at the end of a star's evolution when a similar stationary field of dark matter forms around the highly condensed inner core. The spatial arrangements

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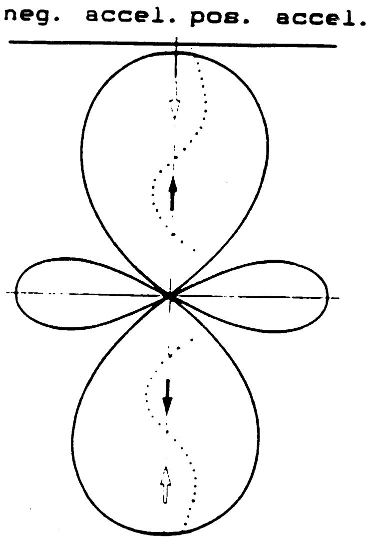

Fig. 1. Formation of bipolar flows

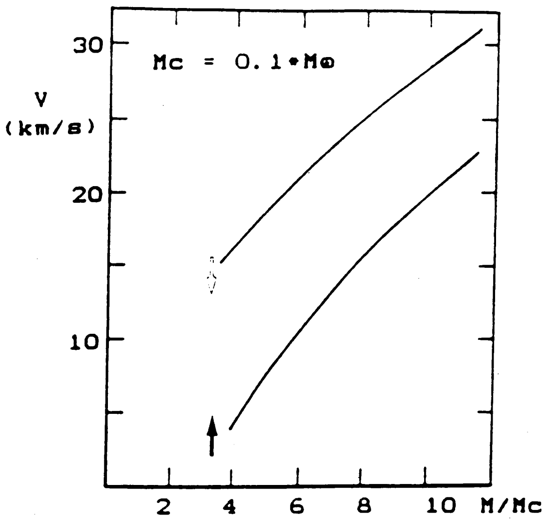

Fig. 2. Calculated end-velocities V

of the outflows and calculated end-velocities, V, agree well with astronomically observed values [LADA, 1992], cf. Fig. 1 and 2 (for a central stellar mass $M_c = 0.1 * M_\odot$ and $0 < M/M_c < 12$, where $M_\odot$ is the mass of the sun and M is the mass of the circumstellar gas cloud). In addition, another pair of outer flows is predicted (open arrows in Fig. 1 and 2), as observed [LADA, 1992]. In areas where the bipolar outflows meet with the opposed counter-flows, highly excited areas of gas are predicted, in agreement with observed areas of MASER-formation during early phases of star evolution [LADA, 1992, STAUDE, 1979]. This model works also at galactic and quasar scales.

The thus generated gravitationally driven bipolar flows may contribute to flows and jets originating from effects due to magnetic fields and/or thermal pressure.

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