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Making astrophysical jets - MHD simulations of accretion, ejection & dynamo action

Prof. Christian Fendt

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Local Host: Dr. Bhargav Vaidya

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BIO:

Christian Fendt is a Professor at Heidelberg University and a staff scientist at the Max Planck Instititue for Astronomy, Heidelberg, Germany.

He is also co-ordinating scientist of the International Max Planck Research School for Astronomy and Cosmic Physics at the University of Heidelberg, IMPRS-HD.

Prof. Fendt obtained his PhD from the Koenigstuhl Observatory in Heidelberg in 1994. Subsequent to which he worked as a Postdoctoral researcher at various places viz., Lund Observatory in Sweden, MPI for Radioastronomy in Bonn and Astrophysical Institute in Potsdam. His main research area are magnetohydrodynamic (MHD) processes processes in the environment of young stars and AGN, in particular the formation of astrophysical jets.

Additionally, his research works involve studies of star formation, accretion disks, active galactic nuclei, micro-quasars, compact objects, radio emission and optical polarisation.

ABSTRACT:

Astrophysical jets are collimated beams of plasma that are believed to be magnetically-driven. Jets are ubiquitous phenomena and are observed in various astrophysical objects viz., planets, young stars of low and high mass, compact neutron stars and black holes. These jets are vital for removing angular momentum from the underlying accretion disk and play an integral role in providing feedback to the surrounding environments both within and outside the host galaxy, or the star formation environment. The study of astrophysical jets requires us to understand an interplay of several physical processes. In particular, in order to understand the launching process, a thorough understanding of connection between the accretion disk and jet is essential.

In this talk, I will review the the basic physical processes responsible for accelerating and collimating the jet during its launching process. Further, I will present results of MHD simulations investigating the launching of astrophysical jets, covering both relativistic and non-relativistic flows. In particular, I will cover the topics of the

1) physical conditions at the launching point of jets,
2) the origin of the jet launching magnetic field as generated by a mean-field accretion disk dynamo, and
3) general relativistic jet launching from close to a black hole that lies at the centre of galaxy.

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