institut für astrophysik
UNIVERSITÄTSSTERNWARTE WIEN

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Leiter des Instituts

Seminar

über

(When) Are Filaments Fundamental?

As the resolution of imaging of the dense interstellar medium has improved, we have gone from a very blobby view, featuring interstellar “clouds" to a much more “stringy" view, featuring interstellar “filaments.” Some three-dimensional shapes in the ISM have a very limited set of possible origins: for example, disks essentially require rotation to be generated. But, prominent filaments (or at least the appearance thereof) can be created by a variety of processes, including various combinations of turbulence, shocks, and fragmentation—all of which can be driven by combinations of gravitational, magnetic and thermal forces. In this talk, I will focus primarily on two kinds of filaments, on two very different scales. On very small scales, I will primarily use the Barnard 5 (B5) core in the Perseus star-forming region as an example. In B5, finer and finer scale mapping reveals filamentary fragments and fibers within a so-called “coherent" core, while zooming out with Herschel shows that the B5 core is itself an elongated high-density peak within a much longer filament, extending far out into the surrounding cloud. I will also show new ALMA results in Serpens, and accompanying MHD simulations, that show filaments persisting to smaller scales still.) On Galactic scales, I will discuss primarily the filaments called “Bones” of the Galaxy. Bones are a special very long (>~100 pc), very thin (<~1 pc), and very dense (>~10^4/cc) class of the many dense, long, filaments being found in the Milky Way. Bones are so long and thin (and thus potentially unstable) that they appear to require the gravitational field of the Galaxy to maintain their existence, and fragmentation of Bones may be caused by, or lead to, massive star formation. Filaments like B5 and Nessie have only recently begun to appear in simulations at all, thanks to moving-mesh simulation codes like AREPO. Given how new both the observed and simulated views of highly-elongated filamentary and fibrous features are in the very dense ISM, there's still plenty of room for speculation on the origins, relevance, and fate of the features observed. It is too soon to tell whether our field's obsession with filaments is a passing fad, or a step along our path to understanding a new fundamental phenomenon.

von

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Harvard University, USA

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des Institutes für Astrophysik, Türkenschanzstraße 17, 1180 Wien