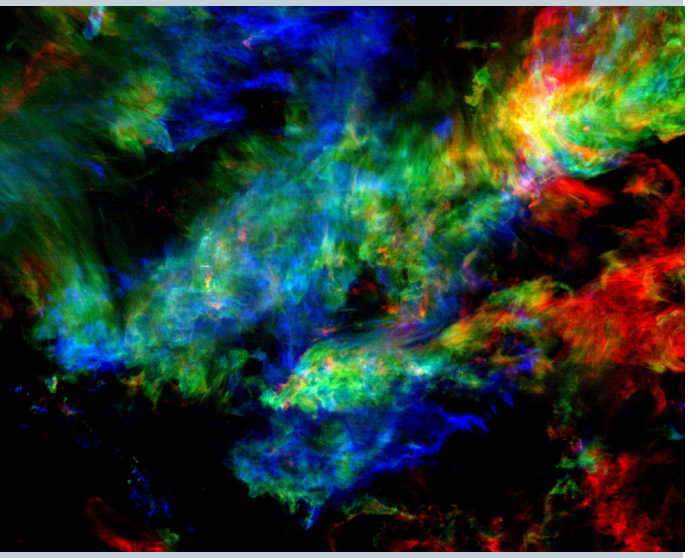
# Colloquium

## SFB 956

Conditions and Impact of Star Formation

**09.12.2013**
Monday 4:00 pm

**Physikalische Institute Köln**
Lecture Hall III
Zülpicher Straße 77 | 50937 Köln



**Mark Heyer**
University of Massachusetts, Amherst

# MHD Turbulence within Interstellar Molecular Clouds

Turbulence within star forming regions of the Milky Way is generally inferred from supersonic velocity dispersions measured in the line profiles of molecular line emission, most notably, the millimeter rotational transitions of 12CO and 13CO. Driven primarily by computational simulations, it has been suggested that the production of newborn stars in molecular clouds is seeded by shocks produced from supersonic, converging streams of material and that the star formation properties (IMF, efficiency, degree of clustering) depend upon the specific attributes of the turbulent gas flow (velocity spectrum, turbulent driving scale, sonic scale). Our ability to measure these attributes has greatly increased in recent years owing to the deployment of heterodyne focal plane arrays at millimeter wavelengths that enable wide field spectroscopic imaging of molecular line emission and the development of analysis tools that exploit the velocity information resident within these data cubes. In my presentation, I will summarize the imaging campaigns of molecular line emission gathered by the FCRAO 14m telescope with the SEQUOIA focal plane array and the application of Principal Component Analysis on these data to derive fundamental properties of turbulent flows in giant molecular clouds. The near universality of velocity structure functions for a large sample of clouds is linked to the widely referenced but often misunderstood Larson (1981) scaling relationships, the driving scale of turbulence in the interstellar medium, and turbulent fragmentation descriptions of star formation. I will also present evidence for velocity anisotropy induced by interactions between Alfven waves (the Goldreich-Sridhar Effect), within the low column density envelope of the Taurus Molecular Cloud. These results emphasize the important role of the interstellar magnetic field in the dynamics of molecular clouds.