

Colloquium

SFB 956

Conditions and Impact of Star Formation

16.11.2015

Monday 4:00 pm

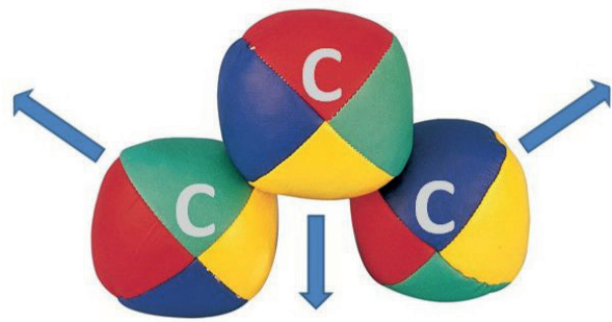
Physikalische Institute Köln

Lecture Hall III

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Laboratory Astrophysics beyond CO

Detection of new molecules in space relies on accurate laboratory data accomplished by high level *ab initio* calculations. Especially for molecules which undergo large amplitude motions the approach of a rigid molecule is no longer useful. Linear C_3 , a textbook example for floppy molecules, turned out to be an abundant molecule in space [1,2]. Recently its structure has been derived experimentally from spectra of ^{13}C substituted C_3 measured at the Kassel laboratories for astrophysics. Singly ^{13}C substituted species ($^{13}C^{12}C^{12}C$ and $^{12}C^{13}C^{12}C$) may also be abundant in space and a possible detection is feasible due to new laboratory data.

Beside C_3 and other carbon chain molecules, small metal containing species and complex organic molecules as well are subject to current investigation at the Kassel laboratories. Their relevance to astrophysical environments have been approved by recent interstellar detections of new metal containing species and large organic molecules (See e.g. Ref [3-6]). The talk presents current progress and developments at the Kassel laboratories.

[1] B. Mookerjea, G.E. Hassel, M. Gerin, T. Giesen, J. Stutzki et al., *Astron. Astrophys.* 546, Art. No. A75 (2012)

[2] B. Mookerjea, T. Giesen, J. Stutzki et al., *Astron. Astrophys.* 521, Art. No. L13 (2010)

[3] T. Kaminski, C. A. Gottlieb, K. M. Menten, N. A. Patel, K. H. Young, S. Brünken, H. S. P. Müller, M. C. McCarthy, J. M. Winters, and L. Decin, *Astron. Astrophys.* 551 (2013), Art. No. A113.

[4] E. D. Tenenbaum and L. M. Ziurys, *Astrophys. J.* 694, L59–L63 (2009).

[5] E. D. Tenenbaum and L. M. Ziurys, *Astrophys. J.* 712, L93–L63 (2010).

[6] A. Belloche, R. T. Garrod, H. S. P. Müller, and K. M. Menten, *Science* 345, 1584–1587 (2014)