**GENERAL**

**EDUCATION and OUTREACH**

**ON-GOING FLIGHT PROGRAM**

**FUTURE FLIGHT PROGRAM - ISSA PHASE I/II/III**

EXACT Investigators Present Results at LT-22

Two posters on the flightFire and ice – a good place to search for life?Jörn HelbertInstitute of Pl definition experiment Experiments Along Coeanetary ResearchDLRRutherfordstrasse 2, 12489 BerlinGERMANYjoern.helbert@dxistence near Tricriticality (EXACT) were presented at the 22nd International Low Temperature Conference (LT-22) held in Helsinki in early August. Professor Norbert Mulders of the University of Delaware, one of lr.de Creating a habitable environment is a complex process involving a withe co-investigators on EXACT, presented his work on deriving the equations for the propagation of heat pulses in mixtures of helium-3 and helium-4. His poster was entitled "A Nonlinear Wave Equation fode variety of interacting processes. A prerequisite for any biological actr Second-Sound Propagation in 3He-4He Mixtures". Also at LT-22, EXACT's work on developing a nano-Kelvin resolivity is an energy source. The terrestrial example of the black smokers shution thermometer for the temperatures below 1K ows how efficient geothermal processes are as an energy source.There is amwas presented by Dr. John Panek of JPL. His poster was entitled "A High-Resolution Thermometer for the Temperature Range 0.75-1.0 K".

**ISSUES AND CONCERNS**

**SCIENCE HIGHLIGHTS**

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Quantum tunneling across spin domains in a Bose-Einstein condensate.

**MIT Group Explores Boundary between Domains in a Condensate**

Wolfgang Ketterle of MIT reports that a paper titled "Quantum tunneling across spin domains in ple morphological evidence for continuous and episodic volcanic activity oa Bose-Einstein condensate" was recently pver the geological history of Mars. The youngest ages determined by the crublished iater size-frequency measurements are about 2 Ma suggesting that the volcann Physical Review Letters (Phys. Rev. Lett. **83**, 661-665 (1999)). The authors D.M. Stamper-Kurn, H.-J. Miesner, A.P. Chikkatur, S. Inouye, J. Stenger, and W. Ketterle describe oes are potentially still active today. While there is no direct evidence dynamics in for volcanic activity the likelihood for localized hot spot activity or hya condensate cdrothermal systems is very high.We have shown recently using thermo-physiconsisting of two immiscible components. In case of two immial modeling that a morphologically identified glacial deposit on the northscible fluids, gravity tries to localize the heavier fluid below the lighter one. When the heavier one is placed on top of the lighter one, a metastable situation arises. The analwestern flanks of Hecates Tholus contains very likely still a stagnant iceogous situation was prepared by the MIT group in a spinor Bose-Einstein cond core. There are several units on Mars, especially on flanks of volcanic eensate, with a magnetic field gradient playing the role of gravity. For a sufficiently strong gradient, tunneling of one component througdifices, which based on morphological evidence may be glacial deposits and which are ph the other was observed and led to a stable equilibrium state. The observation of the tunneling rates provides a sensitive probe of the boundary existing between the two immiscible spin domains.

**UPCOMING EVENTS**