**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?J definition experiment Experiments Along Coeörn HelbertInstitute of Planetary ResearchDLRRutxistence 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 herfordstrasse 2, 12489 BerlinGERMANYjoern.helbethe 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 fort@dlr.de Creating a habitable environment is a r Second-Sound Propagation in 3He-4He Mixtures". Also at LT-22, EXACT's work on developing a nano-Kelvin resolcomplex process involving a wide variety of inteution thermometer for the temperatures below 1K racting processes. A prerequisite for any biologwas 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**

:

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 ical activity is an energy source. The terrestria Bose-Einstein condensate" was recently pal example of the black smokers shows how efficiublished ient geothermal processes are as an energy sourcen 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 .There is ample morphological evidence for contidynamics in nuous and episodic volcanic activity over the gea condensate cological history of Mars. The youngest ages deteonsisting of two immiscible components. In case of two immirmined by the crater size-frequency measurementsscible 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 anal are about 2 Ma suggesting that the volcanoes arogous situation was prepared by the MIT group in a spinor Bose-Einstein conde potentially still active today. While there isensate, with a magnetic field gradient playing the role of gravity. For a sufficiently strong gradient, tunneling of one component throug no direct evidence for volcanic activity the lih 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**