**GENERAL**

**EDUCATIFire and ice – a good place to search for life?Jörn HelbON and OUTREACH**

**OertInstitute of Planetary ResearchDLRRutherfordstrasse 2N-GOING FLIGHT PROGRAM**

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

EXACT Investigato, 12489 BerlinGERMANYjoern.helbert@dlr.de Creating a habrs Present Results at LT-22

Two posters on the flight definition experiment Experiments Along Coexistence near Tricriticality (EXACT) were presented at the 22nd International Low Temperature Conference (LT-22) held in Helsinki in early August. Professor Norbert Mitable environment is a complex process involving a wideulders of the University of Delaware, one of the co-investigators on E variety of interacting processes. A prerequisite for anXACT, presented his work on deriving the equations for the propagation of heaty biological activity is an energy source. The terrestri pulal example of the black smokers shows how efficient geotses in mihermal processes are as an energy source.There is ample xtures of helium-3 and helium-4. His poster was entmorphological evidence for continuous and episodic volcaitled "A Nonlinear Wave Equation for Second-Sound Propagation in 3He-4He Mixtures". Also at LT-22, EXACT's work on developing a nano-Kelvin resolution thermometer for the temperatures below 1K was presented bynic activity over the geological history of Mars. The yo Dr. John Panek of JPL. His poster was entitled "A High-Resolution Thermometer for the Temperature Range 0ungest ages determined by the crater size-frequency meas.75-1.0 K".

**ISSUES AND urements are about 2 Ma suggesting that the volcanoes arCONCERNS**

**SCIENCE HIGHLIGHTS**

:

Quantum tunneling across spin doe potentially still active today. While there is no diremains in a Bose-Einstein condensate.

**MIT Group ct evidence for volcanic activity the likelihood for locExplores Boundaryalized hot spot activity or hydrothermal systems is very between Domains in a Condensate**

Wolfgang high.We have shown recently using thermo-physical model Ketterle ofing that a morphologically identified glacial deposit on MIT reports the northwestern flanks of Hecates Tholus contains verythat a paper titled "Quantum tunneling across spin domains in a Bose-Einstein conde likely still a stagnant ice core. There are several uninsate" was recently published in Physical Review Letters (Phys. ts on Mars, especially on flanks of volcanic edifices, wRev. Lett. **83**, 661-665 (1999)). The authors D.M. Stamper-Kurn, H.-J. Miesner, A.P. Chikkatur, S. Inouye, J. Stenger, hich based on morphological evidence may be glacial depoand W. Ketterle dsits and which are possibly still ice-cored. Combining tescribe dynamics in a condensate conhese two findings provides an interesting option for a bsisting of two immiscible components. In case of tiological niche. Our modeling shows that variations in two immiscible fluids, gravity tries to localize the heavier fluid below thhe climate and in the local internal heat flow due to one lighter one. When the going volcanic activity can create a complex internal stheavierructure of these ice deposits. The ice deposits can effe one is placed on top of the lighter one, a metastable situation arises. The analogous situation was prepared by the MIT group in a spinor Boctively store volcanic gases. The enrichment of water icse-Einstein condensate,e with volcanic gases might form a nutrient rich environ with a magnetic field gradient playing the role of gravity. For a sufficiently strong gradient, tunnelment which is protected by a dust cover and sealed by aning of one compon enrichment of ice at the top. The implications for biolent through the other was observed ogical activity in these places deserve further attention.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**