

Breakthrough in Nano Physics

By KAUSHIK PRADHAN

Kolkata, Nov. 5: A breakthrough of sorts has been made by city scientists at Saha Institute of Nuclear Physics. Their study conclusively proved that any object must have length, breadth and height to have permanent magnetic properties (ferro-magnetism) at any finite temperature.



The theory "Mermin-Wagner Theorem" was published in "Physical Review" in 1966. Even though scientist duo N.D. Mermin and H. Wagner propounded the theory, they failed to establish it as a clinical phenomenon in the laboratory. Exactly 39 years later, Professor Milan Sanyal along with student Mrinmay Mukhopadhyay realised the theorem at the SINP laboratory. The study was conducted in collaboration with Prof T. Sakakibara of the University of Tokyo, Dr V. Leiner of ILL, France and R.M. Dalglis and D. S. Langridge of Rutherford Application Laboratory, Oxford.

The SINP findings "Observation of Spinwave Characteristics in Two Dimensional Ferro-Magnetic Ordering of In-Plane Spins" have been submitted for publication in an international science journal.

Elaborating on the same, Prof Sanyal said: "Mermin and Wagner propounded the theorem but could not prove it. This is a major breakthrough in Nano Physics."

Major experiments of the study were carried out at SINP laboratory. "For neutron scattering study and magnetisation measurements at milli Kelvin temperature we used the facilities of Rutherford Application Laboratory and University of Tokyo," Prof Sanyal added.

In a bid to derive upon ferro-magnetic ordering in two dimensional systems, Prof Sanyal and Mr Mukhopadhyay formed a two-dimensional body. "The total mass of a two-dimensional body is very nominal. It is impossible to observe the ferro-magnetic ordering at this level of mass. So we formed multi-layer of two dimensional body," Prof Sanyal explained.