ICFO COLLOQUIUM ALEXANDER FETTER 'Trapped Rotating Bose-Einstein Condensates'

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February 27, 2017

Monday, February 27, 12:00, ICFO Auditorium

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Professor Emeritus, Department of Physics and Applied Physics, Stanford University$$Alexander Fetter is Professor Emeritus of Physics and Applied Physics at Stanford University. His current problems of interest include vortex dynamics on curved surfaces and in trapped coherently coupled Bose-Einstein condensates.

Fetter graduated with a B.A. from Williams College in 1958, where he was valedictorian. He was also a Rhodes Scholar at Balliol College of Oxford University, and then went on to receive a PhD in Physics at Harvard University in 1963. He spent two years at the University of California, Berkeley as a Miller Postdoctoral fellow. In 1965, he joined the faculty at Stanford

University, and has been there since. He served as chair of the Physics Department from 1985 to 1990.

Fetter is a fellow of the American Physical Society and American Association for the Advancement of Science. He served as the director of the Hansen Experimental Physics Laboratory and the Geballe Laboratory for Advanced Materials. During his career at Stanford, he received three awards for teaching, culminating in the Stanford Dean?s Award for Lifetime Achievements in Teaching (2008).

After reviewing the basic physics of Bose-Einstein condensation, I discuss the non-linear Gross-Pitaevskii equation that provides a good description of a trapped dilute condensate. Here the interest is the rotational properties of the condensate, especially the role of quantized vortex lines. For slow rotations, only a few vortices appear, but as the angular velocity increases, the vortices form a triangular lattice that is analogous to the Abrikosov vortex lattices in type-II superconductors. Eventually the system enters the lowest Landau level regime where the mean interaction energy per particle is small compared to the energy gap separating the first and second Landau levels. For very fast rotations, theorists predict a quantum phase transition to a non-superfluid highly correlated state analogous to those seen in the quantum Hall regime for two-dimensional electrons in a strong magnetic field.

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