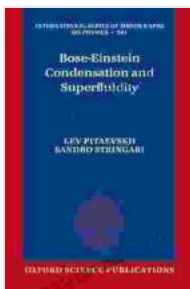


Bose-Einstein Condensation and Superfluidity: A Journey into the Quantum Realm

Bose-Einstein condensation (BEC) is a remarkable state of matter that occurs when a gas of bosons, particles with integer spin, is cooled to near absolute zero (-273.15 °C or -459.67 °F). In this state, the bosons lose their individuality and behave like a single coherent wavefunction, exhibiting quantum mechanical properties on a macroscopic scale. BEC was first predicted by Albert Einstein in 1924 and Satyendra Nath Bose in 1925, and it was experimentally observed in 1995 by Eric Cornell, Wolfgang Ketterle, and Carl Wieman.

Superfluidity is a related phenomenon that occurs when a fluid flows without friction. This property is typically associated with BECs, but it can also occur in other systems, such as liquid helium and neutron stars.

BEC and superfluidity have a wide range of applications in physics, including quantum computing, astrophysics, and condensed matter physics. They are also being used to develop new technologies, such as atom lasers and quantum sensors.



Bose-Einstein Condensation and Superfluidity (International Series of Monographs on Physics Book

164) by Liss C. Werner

★★★★☆ 4.7 out of 5

Language : English

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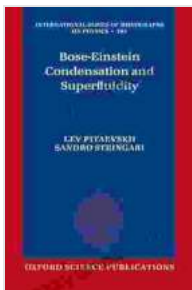


When a gas of bosons is cooled to near absolute zero, the particles lose their individuality and condense into a single quantum state. This is called Bose-Einstein condensation. The condensed bosons behave like a single coherent wavefunction, and they exhibit quantum mechanical properties on a macroscopic scale.

The temperature at which BEC occurs depends on the density of the gas. For a dilute gas, the critical temperature is given by the following equation:

$$T_c = (3.31h^2)/(2mk_B)$$

where: * T_c is the critical temperature * h is Planck's constant *



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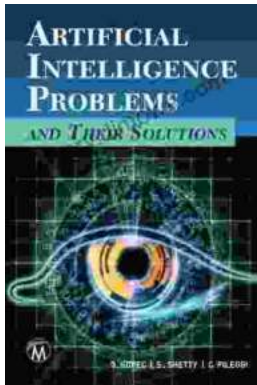
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