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Book review

Bose–Einstein Condensation
L Pitaevskii and S Stringari
Oxford: Oxford University Press (2003)
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The Gross–Pitaevskii equation, named after one of the authors of the book, and its large number of applications for describing the properties of Bose–Einstein condensation (BEC) in trapped weakly interacting atomic gases, is the main topic of this book.

In total the monograph comprises 18 chapters and is divided into two parts. Part I introduces the notion of BEC and superfluidity in general terms. The most important properties of the ideal and the weakly interacting Bose gas are described and the effects of nonuniformity due to an external potential at zero temperature are studied. The first part is then concluded with a summary of the properties of superfluid ^{4}He. In Part II the authors describe the theoretical aspects of BEC in harmonically trapped weakly interacting atomic gases. A short and rather rudimentary chapter on collisions and trapping of atomic gases which seems to be included for completeness only is followed by a detailed analysis of the ground state, collective excitations, thermodynamics, and vortices as well as mixtures of BECs and the Josephson effect in BEC. Finally, the last three chapters deal with topics of more recent interest like BEC in optical lattices, low dimensional systems, and cold Fermi gases.

The book is well written and in fact it provides numerous useful and important relations between the different properties of a BEC and covers most of the aspects of ultracold weakly interacting atomic gases from the point of view of condensed matter physics. The book contains a comprehensive introduction to BEC for physicists new to the field as well as a lot of detail and insight for those already familiar with this area. I therefore recommend it to everyone who is interested in BEC. Very clearly however, the intention of the book is not to provide prospects for applications of BEC in atomic physics, quantum optics or quantum state engineering and therefore the more practically oriented reader might sometimes wonder why exactly an equation is termed useful or important.

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