

Universidade de São Paulo Instituto de Física de São Carlos

Semana Integrada do Instituto de Física de São Carlos

13^a edição

Livro de Resumos

São Carlos
2023

Ficha catalográfica elaborada pelo Serviço de Informação do IFSC

Semana Integrada do Instituto de Física de São Carlos
(13: 21-25 ago.: 2023: São Carlos, SP.)

Livro de resumos da XIII Semana Integrada do Instituto de Física de São Carlos – Universidade de São Paulo / Organizado por Adonai Hilário da Silva [et al.]. São Carlos: IFSC, 2023.
358p.

Texto em português.

1.Física. I. Silva, Adonai Hilário da, org. II. Título.

ISSN: 2965-7679

PG139

Dynamic of vortex in a dipolar BEC bubble

BERETA, Sálvio Jacob¹; SANTARELLI, Mônica Andrioli Caracanhas¹

salviojacobbereta@yahoo.com.br

¹Instituto de Física de São Carlos - USP

In this project is presented a semi-analytical solution to the density profile of a Bose-Einstein condensate (BEC) with dipolar interaction in a quasi-2D shell potential. This solution will allow us to determine each term that compose the system total energy, and will help to understand the cloud collapse. There theoretical models for purely 2D shell where the cloud does not collapse even for high dipole interaction. (1) However, we verified numerically that for quasi 2D shell the BEC dipolar cloud can collapse when the ratio of the dipolar interaction and the contact interaction parameters are order of 1. The dipolar energy increases with the density, our numerical simulations presents that for higher number of particles and confinement this ratio is smaller to collapse the cloud. We intend to apply our ansatz to determine these critical parameter values. With our analytical solution for the stationary dipolar BEC, it is possible to solve the dynamics of the vortices in the shell through the time-dependent Lagrangia formalism, using the results obtained by the author and already published. (2)

Palavras-chave: Bose-Einstein condensate. Bubble trap. Dipole interaction.

Agência de fomento: CAPES (88887.505539/2020-00)

Referências:

1 DINIZ, P. C. *et al.* Ground state and collective excitations of a dipolar Bose-Einstein condensate in a bubble trap. **Scientific Reports**, v. 10, p. 4831-1-4831-10, 2020.

2 BERETA, S. J.; CARACANHAS, M. A.; FETTER, A. L. Vortex dynamics on a spherical film. **Physical Review A**, v. 103, n. 5, p. 053306-1-053306-9, May 2021.