

Vortex-Antivortex Pair Production in Perturbed Dipolar Bose-Einstein Condensate

S SABARI¹, L TOMIO¹, AND R K KUMAR²

¹*Institute of Theoretical Physics, Universidade Estadual Paulista, Rua Bento Teobaldo Ferraz, 271, Barra Funda, São Paulo, São Paulo, Brazil. Contact Phone: +551133937809*

²*Dodd-Walls Centre, Department of Physics, University of Otago, Dunedin, New Zealand
Contact Email: lauro.tomio@gmail.com*

The dynamics of vortex-antivortex pair productions with the associated critical velocities are investigated in perturbed dipolar Bose-Einstein condensates (BECs), by using a quasi-two-dimensional mean-field Gross-Pitaevskii (GP) model. By exploring the range of dipolar interaction strengths it is also verified the regime in which turbulent behaviors can be observed. In our approach, the emission of vortex and antivortex pairs in dipolar BECs is produced by circularly moving blue detuned laser, simulated by a two-dimensional Gaussian obstacle. Through numerical simulations, we investigate the nucleation and dynamics of the produced vortex-antivortex pairs.

Acknowledgements: Work partially supported by the Brazilian funding agencies CNPq and FAPESP.