



**S N BOSE NATIONAL CENTRE
FOR BASIC SCIENCES**

Block JD, Sector III, Salt Lake, Kolkata 700 106

DEPARTMENTAL SEMINAR **Theoretical Sciences**

27th October'2021

3.00PM

ONLINE

SPEAKER

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TITLE OF THE TALK

Supersolid in Ultracold atoms

ABSTRACT

Supersolid behaviour of matter has been long explored. Since its first prediction by Gross in 1957 [1], it has to endure 'no-go' theorem [2] and a myriad number of experimental road-blocks, before its realisation in the ultracold dipolar systems [3]. We trace this arduous journey of the supersolid phase and demonstrate an exact solution in a physically related cold atomic system [4], with traditional mean-field repulsive and beyond-mean-field attractive correction [5]. This system has led to the experimental discovery of the self-trapped quantum droplets, in a free floating condition. The exact solution highlights the way around the no-go theorem and delineates the parametric domain, where this novel phase of matter can be observed in the same system, possessing quantum droplets.

[1] E. P. Gross, Phys. Rev. 106, 161 (1957).

[2] O. Penrose and L. Onsager, Phys. Rev. 104, 3 (1956).

[3] Tobias Donner, 12, 38, Physics (2019) and references therein.

[4] M. K. Parit, G. Tyagi, D. Singh and P. K. Panigrahi, 54, 105001, J. Phys. B: At. Mol. Opt. Phys. (2021).

[5] D. S. Petrov, 115, 155302, Phys. Rev. Lett. (2015)

HOST FACULTY

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