



ΓΕΝΙΚΟ ΣΕΜΙΝΑΡΙΟ ΤΜΗΜΑΤΟΣ ΦΥΣΙΚΗΣ

***PHYSICS COLLOQUIUM***Thursday, 20 March 2008  
17:00-18:003<sup>rd</sup> Floor Seminar Room***“Nonlinear Effects & Fluctuations in Atomic Bose-Einstein Condensates”***Dr. Nick Proukakis  
School of Mathematics and Statistics, Newcastle University

## ABSTRACT

At extremely low temperatures, trapped atomic gases have been observed to undergo a phase transition into a so-called Bose Einstein condensate. This state exhibits collective behaviour and presents an ideal system for studying nonlinear effects. After a brief general introduction, the first part of this talk will focus on the dynamics of dark solitons [1] and vortices [2] in such systems, and their interactions with the background sound field [3]. Agreement with recent experiments will be shown to necessitate the consideration of thermal effects [4], with the origin of the theoretical models used presented briefly [5]. A proposed experiment investigating the growth of a degenerate Bose gas in a dimple microtrap created on an atom chip will be theoretically modelled [6], and a brief discussion will be given of the importance of fluctuations of the condensate phase in such elongated geometries [7].

- [1] Parker, Proukakis et al., PRL 90, 220401 (2003)
- [2] Parker, Proukakis et al., PRL 92, 160403 (2004).
- [3] Proukakis et al., PRL 93, 130408 (2004).
- [4] Jackson, Proukakis et al, PRA 75, 051601(R) (2007).
- [5] Proukakis, cond-mat/0706.3541 (2007).
- [6] Proukakis et al., PRA 73, 053603 (2006).
- [7] Proukakis, PRA 73, 023605; ibid. 74, 053617 (2006).