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Solvable model of the second order phase transition in rotating BEC[1] MAHIR HUSSEIN, Max Planck Institut fur Physik Komplexer Systeme, Dresden, Germany, KLAUS BARTSCHAT, Drake University, PIETER VAN ISACKER, Grand Accelerateur National d'Ions Lourds, France, OLEG VOROV, UNC at Charlotte — We solve analytically a model of the second-order phase transitions that arises in the context of rotating Bose-Einstein condensate of cold atoms in a magnetic trap, interacting via two-body forces [1,2]. The solution allows one to classify the instabilities in the condensates which occur when the rotational speed is increased [3]. In the case of predominantly repulsive interactions, the transition corresponds to the vortex entry the condensate. The transition to the Abrikosov state follows if the rotational speed is increased further. In the case of predominantly attractive interactions, the transition corresponds to the escape of the condensate from the trap at the critical speed.

[1] O. K. Vorov, P. Van Isacker, M. S. Hussein and K. Bartschat, Phys. Rev. Lett. 95, 230406 (2005).
[2] O. K. Vorov, M. S. Hussein and P. Van Isacker, Phys. Rev. Lett. 90, 200402 (2003).
[3] O. K. Vorov, P. Van Isacker, M. S. Hussein and K. Bartschat, to be submitted to Nature (2009).

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