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## Models of interaction and few-body problems in ultra-cold physics

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Ultra-cold atoms permit to explore few-body systems in regimes where two-body scattering is resonant. The zero-range approximation of the pairwise interaction is especially adapted to the so-called unitary regime, while for a large but finite scattering length or also in p wave resonances, more detailed approaches are needed for describing few-body systems. In this talk, we show the interest of different models of interaction in the analysis of several few-body properties found recently. In particular, the separable two-channel model which encapsulates the Feshbach resonance mechanism appears as a relevant tool for ultra-cold atoms and the description of deviations to universal laws while leading to integral equations having the same degree of complexity as zero-range approaches.

Author: Dr PRICOUPENKO, Ludovic (LPTMC - Université Pierre et Marie Curie (Paris 6))

**Co-auteurs:** Dr MORA, Christophe (LPA - Université Denis Diderot (Paris 7)); Dr JONA-LASINIO, Mattia (ITP - Leibniz Universität Hannover); Dr CASTIN, Yvan (Laboratoire Kastler Brossel - CNRS (Paris))

Orateur: Dr PRICOUPENKO, Ludovic (LPTMC - Université Pierre et Marie Curie (Paris 6))