

## セミナー

講演タイトル : Mesophases of core-softened colloids  
講演者 : Primoz Ziherl 氏 (Jožef Stefan Institute, Slovenia)

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31 号館 305 室

連絡先 : 堂寺

### 講演内容

大学院講義ソフトマター物理学の一部として、分野外の人々にも易しいコロイド物理学の紹介的内容を含む講演をお願いした。

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Over three decades ago, the hard-core/soft-shoulder interparticle potential has been introduced to explain the non-monotonic melting line in cesium and cerium. The recent advances in colloidal science have revived the interest in this model potential, and we use theoretical methods, numerical simulations, and experiments to study the phase diagram of a two-dimensional ensemble of classical particles interacting with a hard core and repulsive, soft shoulder. Our theoretical results describe the limit of large shoulder width to core size where the system displays a remarkable array of universal aggregate phases arising from the competition between the hard-core and soft-shoulder length scales, including fluid and crystalline phases with micellar, lamellar, and inverse micellar morphology. Surprisingly, the phase sequence and aggregate size adjust so as to keep an almost constant interaggregate separation. A complementary insight into the complexity of the fluid-solid transition in a hard-core/soft-shoulder system in the moderate shoulder width regime is provided by an experimental study of micrometer-size superparamagnetic colloids. The dipolar pair repulsion between the spheres trapped in a thin cell is induced by a transverse magnetic field and softened by suitably adjusting the cell thickness. We scan a broad density range and we materialize a large part of the theoretically predicted phases in systems of core-softened particles, including expanded and close-packed hexagonal, square, chain-like, stripe/labyrinthine, and honeycomb phase.