**Phase Diagram for Single-Patchy-Particles**

Susanne Wagner¹

Eva G. Noya², Yura Kalyuzhnyi³, Gerhard Kahl¹

¹ ITP, TU Wien, ² Lviv Institute of Physics and Mechanics, ³ CSIC Madrid

**Introduction**

- patchy particles in two dimensions with Kern-Frenkel type potential [1]
- existing literature: phase diagrams computed using self-consistent phono-
  non theory (SCP) by [2]
- simulation approach: computing regions of coexisting solid and fluid pha-
  ses using MC simulation techniques
- theoretical approach: RTPT-CF [3,4]

**Theory and Simulation Comparison**

- results from the theoretical framework multidensity resummed thermodynamic per-
  turbation theory for fluids with central-force type of associative potential (RTPT-
  CF) [3,4] are depicted in solid lines for particles with $\theta = 43^{\circ}$ and $\delta = 0.5\sigma$
- simulation results in circles

**Particle Configurations**

- solid: disks arrange on a hexagonal lattice and form dimer bond patterns
- fluid: mixture of dimers and monomers with no positional order

**Simulation Details**

- NVT-MC and NPT-MC simulations
- quenching system from high tempera-
  tures (hard disk reference state)\(\Delta\)\(\Delta\)
- compressing system starting from low pressures (ideal gas reference state)\(\Delta\)\(\Delta\)
- \(N = 576\) particles\(\Delta\)\(\Delta\)
- \(1\times6\\)\(\Delta\)\(\Delta\)\(\Delta\)\(\Delta\)\(\Delta\)\(\Delta\) cycles

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Contact: susanne.wagner@tuwien.ac.at