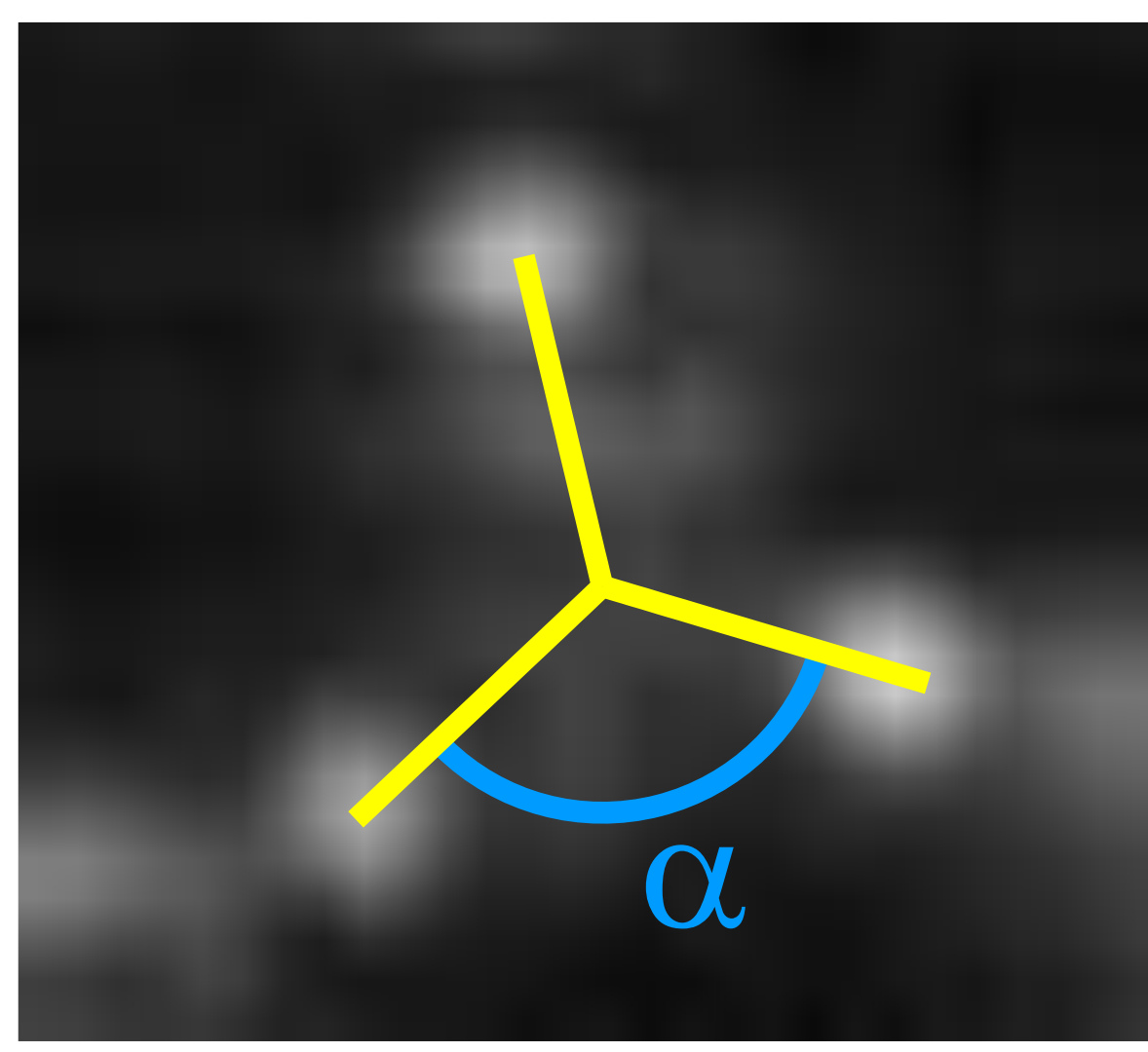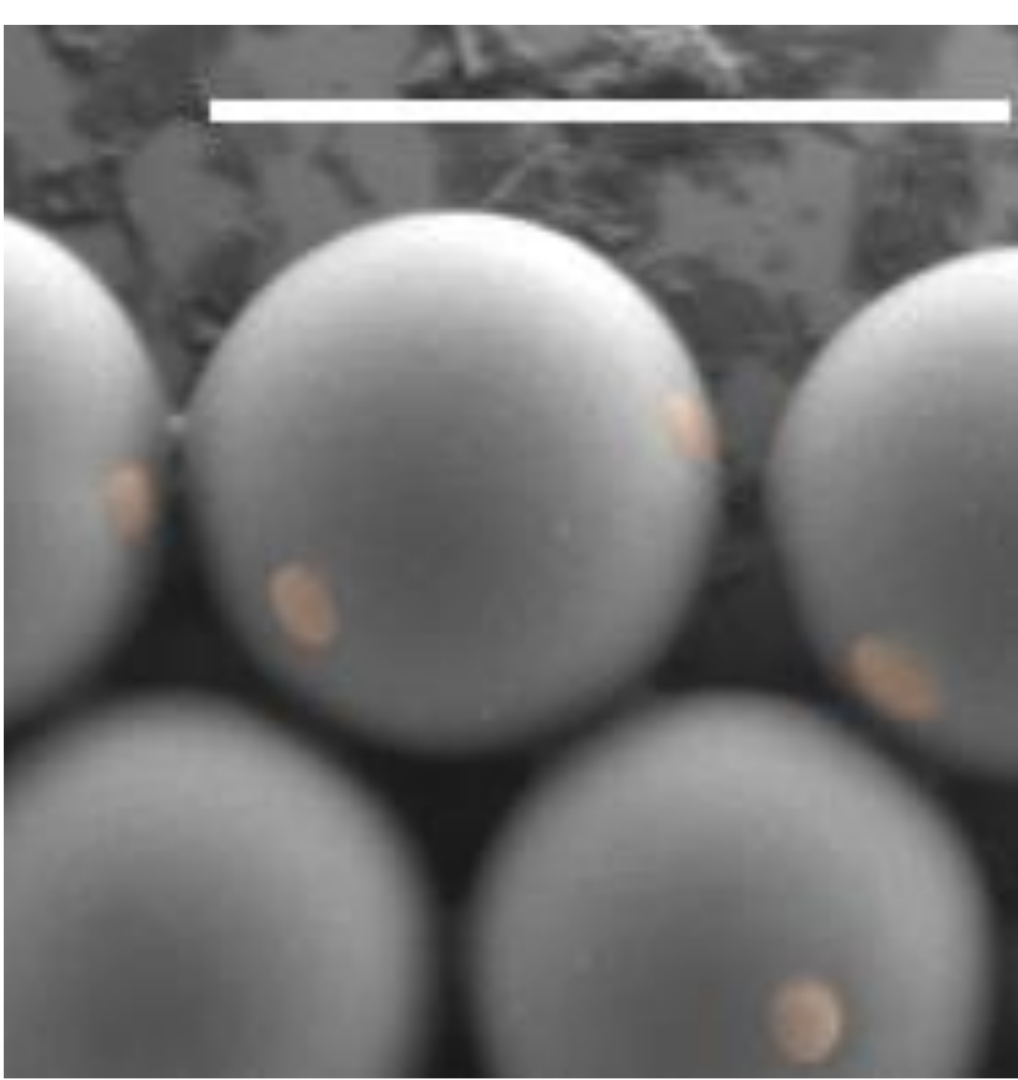# Building Colloidal Graphene

**Piet J.M. Swinkels, Zhe Gong, Stefano Sacanna, and Peter Schall**

By using state-of-the-art patchy colloids and our experience in colloidal assembly with the critical Casimir force, we have assembled particles into the honeycomb lattice – colloidal graphene.
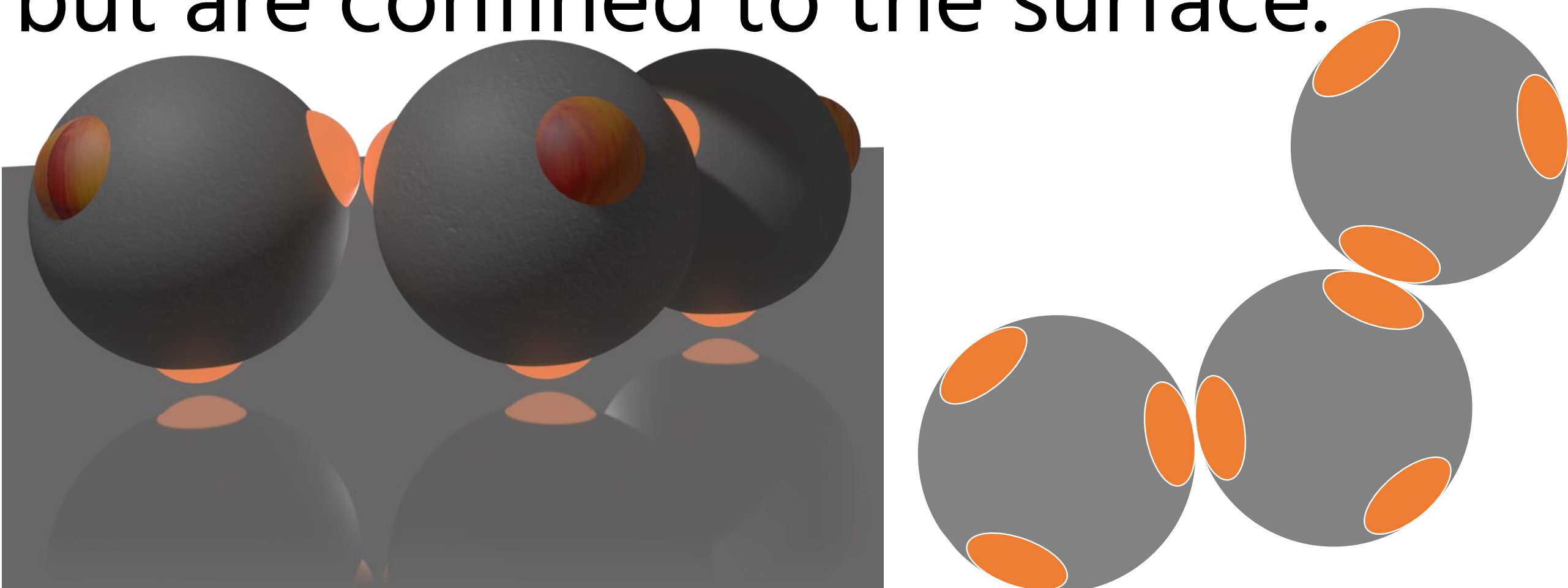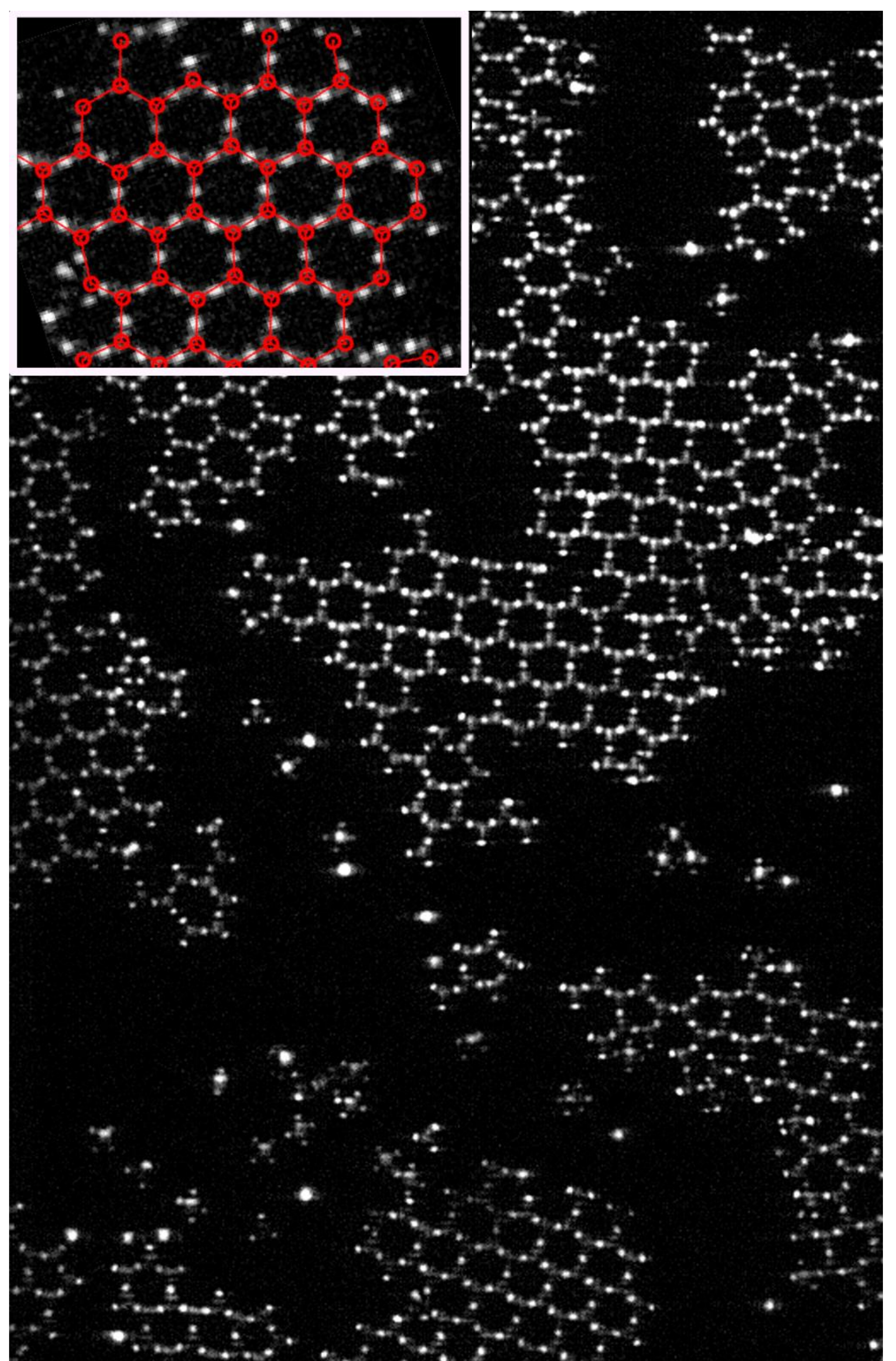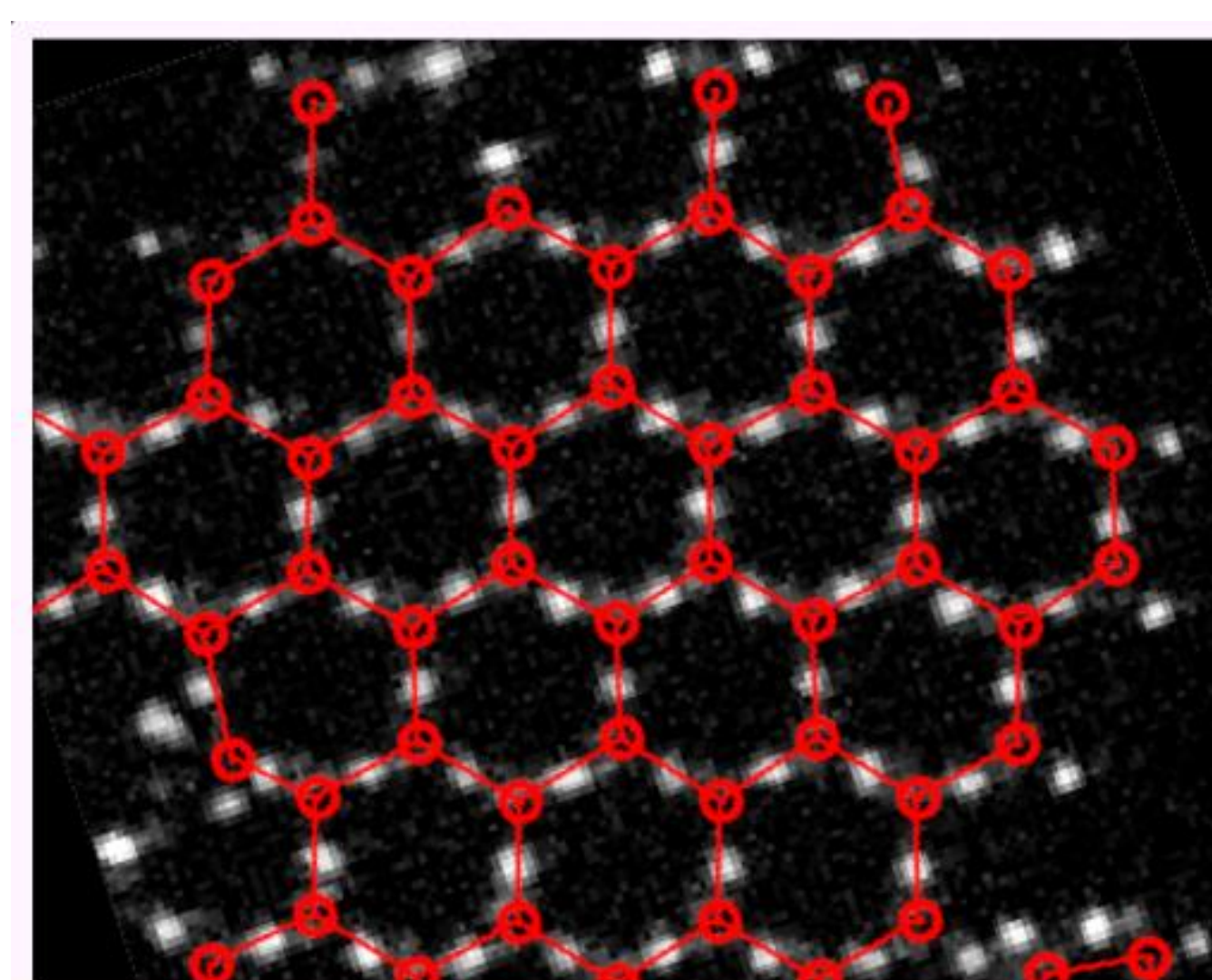
## Building blocks



Tetrahedral patchy particles with a radius of 0.9 µm attract each other at their fluorescent patches trough the critical Casimir force.

## Effectively 2D

By binding one of the patches to the surface, we leave three triangular bonding sites. The particles are still mobile, and can bind to each other, but are confined to the surface.



## The result



## What can we do with this?

- Surprisingly rich phase behaviour: gas, liquid, honeycomb, and triagonal, as was predicted in simulations.
- Assembly: similarities and differences with CVD graphene growth.
- Defects: 5-rings and 7-rings, crystal boundaries, and missing particles.
- Grow a phase-spanning honeycomb crystal.