Contribution ID: **47** Type: **Poster**

# Vortex matter simulation of the one component plasma

*Wednesday 4 September 2024 17:00 (2 hours)*

In this work, we explore the low-energy states of vortex matter in a quasi-2D uniform BEC superfluid [1,2]. Mapping this system to 2D charges, we realize a vortex matter simulator of the one-component plasma (OCP) a fundamental minimal model in condensed matter. While the OCP is broadly considered a toy model, our system realizes its equilibrium states exactly. To benchmark our simulator, starting from the minimum energy state, a Wigner crystal, and we observe the melting of the lattice under systematic heating. We observe several predicted features of melting transition, including excess density at the edge of the vortex cluster, spatial squeezing of the density distribution, and persistent crystallization at the cluster edge [3]. These states of vortex matter have gained prominence in the theory of the fractional quantum Hall effect, where the 2D electron gas moves analogously to vortices in an incompressible fluid, and the vortex density maps to the density of the quantum Hall droplet.

## References

## Short bio (50 words) or link to website

uq-bec.org

## Relevant publications (optional)

## Career stage

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