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Lattice melting and surface Topological order in 3D Time reversal invariant topological superconductor YIZHI YOU, KITP — In this talk, we start from the eight copies of 3D Time reversal invariant topological superconductor on a crystal. By proliferating and condensing the disclinations, we can therefore restore the spatial rotation symmetry of the lattice crystal. During the procedure of lattice melting, the fermion acquires a π Berry Phase when winding around the 2π disinclination and therefore the fermions get confined when disclination loop proliferates. After the disclination condensed, we obtained a 3D bosonic SPT phase with by T and spatial rotation symmetry.In addition, we investigate the surface state of this Bosonic SPT. If we break the T symmetry on the surface, the 8 majorana cones are gapped and the 2π disclination has semion statistics. To obtain a T and rotation invariant gapped surface state, we first turn on Fulde-Ferrell superfluid order of the surface to gap the surface fermion and then condensed the vortex/disclination of the superfluid to restore the T and rotation symmetry. The disclination dipole and vortex exhibit fractional statistics and therefore vortex condensation and lattice melting give rise to new surface topological order.

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