CrSBr Polariton Laser

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Exciton-polaritons are hybrid light-matter excitations that arise in the regime of strong light matter coupling in optical microcavities. Due to their bosonic nature, at elevated quasi-particle densities, polaritons can condense into a coherent quantum state, which is accompanied by a coherent light emission.

I will present the implementation of a spectrally tunable open optical cavity in a liquid-helium-free magneto-optical cryostat. It is ideally suited for the study of exciton-polaritons based on van-der-Waals materials. I will specifically highlight the case a CrSBr thin layer embedded in our cavity framework. The CrSBr slab forms a Fabry-Perot cavity of low quality factor, which coherently couples to a high Q-factor open cavity resonance. The resulting system undergoes a transition to a non-linear regime of polariton condensation. The coherence properties of the resulting polariton laser are studied via first and second order coherence measurments. As an intriguing feature, we detect a magnetically tunable non-linearity arising from the interaction of CrSBr cavity polaritons with incoherent magnons.