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Optical properties of two dimensional gallium selenide ALARIC BERGERON, Polytechnique Montreal, RICHARD LEONELLI, Universite de Montréal, SEBASTIEN FRANCOEUR, Polytechnique Montreal, COPL TEAM —
Gallium selenide is a layered metal chalcogenide compound with peculiar but attractive optical properties. Its very high d_{22} coefficient, along with its optical transparency from 0.65 to 18 μm and high optical damage threshold, makes it an ideal material for non-linear optical applications. The band structure of GaSe presents a pseudo-direct bandgap, with the direct transition sitting $\sim$20 meV above the indirect one, allowing for efficient photoconductivity and photoluminescence. This could prove interesting for various optoelectronic applications. In this study, we have analyzed the angular and polarization dependence of photoluminescence and second harmonic generation of 2D GaSe flakes of varying thicknesses, down to the monolayer. These results are examined in the light of the few-layer structure symmetry and the unusual optical selection rules forbidding light emission perpendicularly to the basal plane.

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