DEPARTMENT OF **PHYSICS**

CME Seminar

Thursday, March 10, 2016

11:30am Robert Smith Seminar Room

1080 Physics Research Building

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"Stimulated Emission and Lasing Properties from Ce Lead Halide Perovskite Nanocrystals"

Optical gain and lasing properties in a new class of emerging quantum materials, the colloidal all-inorganic cesium lead halide perovskite quantum dots (IPQDs) (CsPbX3, X = Cl, Br, I) will be presented. Our result has indicated that such material system show combined merits of both colloidal quantum dots and halide perovskites. Low-threshold and ultrastable stimulated emission was demonstrated under atmospheric condition. The gain mechanism is attributed to biexcitonic recombination. The flexibility and superior optical gain properties of these CsPbX3 IPQDs were manifested by demonstration of an optically pumped micro-laser. The nonlinear optical properties including the multi-photon absorption and resultant photoluminescence of the CsPbX3 nanocrystals were investigated. A large two-photon absorption cross-section of up to ~1.2×105 GM is determined from 9 nm-sized CsPbBr3 nanocrystals. Moreover, low-threshold frequency-upconverted stimulated emission by multi-photon absorption was observed from the thin films of close-packed CsPbBr3 nanocrystals.

Faculty Host: Dr. Denis Pelekhov

The Ohio State University