Contribution ID: **46** Type: **Poster Only**

Flying on the wings of light

Photonic Crystal Light Sails can travel through space without fuel on board and sustain a slight but continuous laser-driven acceleration for an extended period. Numerical simulations have shown that a specific type of Anisotropic Photonic Crystal Slab with three different dielectric constant regions exhibits a complete Photonic Band Gap for a narrow frequency range and is transparent for the rest of the light spectrum. The photonic device consists of small-diameter, high-index-of-refraction Germanium pillars and large-diameter, empty holes, all encapsulated by a low-index-of-refraction polymer. Such a structure has a significantly improved area-to-mass ratio, primarily due to its empty space. Several other advantages over current Light Sails materials have been observed. Initially, a Proof-of-principle sample was manufactured at the Center of Nanophase Material Sciences. Later, two fully functional devices were fabricated, one with equal diameters of pillars and holes, and the other with large holes and small pillars. Currently, the devices are under investigation to measure their spatial, transmission, reflective, and absorptive properties. Later this year, more samples are planned to be manufactured featuring different spatial patterns. The most challenging task is to create a layered three-dimensional photonic crystal, based on he already manufactured slab.
Ultimately, the final step is to fly our photonic crystal into space.

Topical Area

Hard matter: energy materials

Author: DIMITROV, Dimitar (Tuskegee University)

Co-author: Mr TAYLOR-HARRIS, Elijah (Tuskegee University)

Presenter: DIMITROV, Dimitar (Tuskegee University)