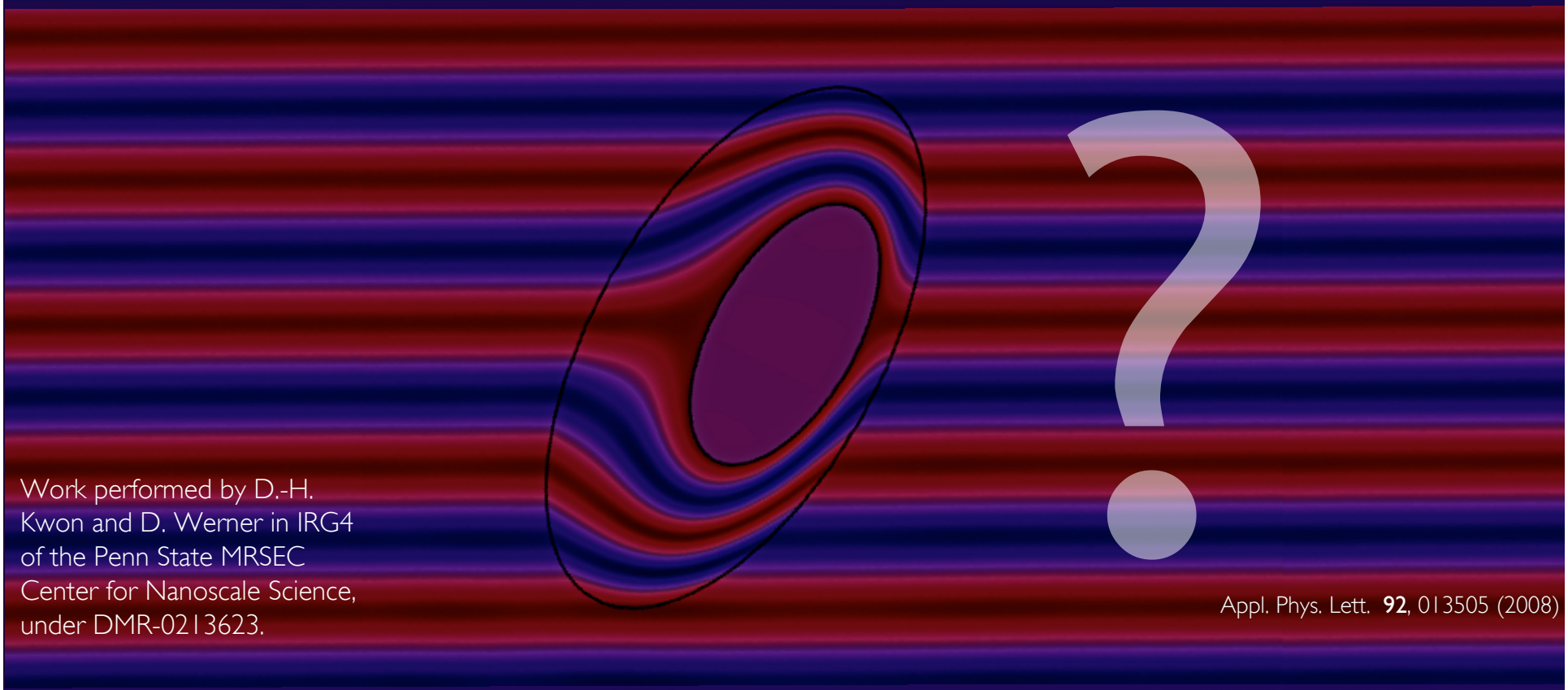
An **electromagnetic cloak** guides light smoothly around an object; the light emerges on the other side seemingly undisturbed, as if the object wasn't there. Such a cloak requires optical materials built from structures smaller than the wavelength of light. By getting "underneath" the scale of light itself, these structures can generate a near-zero refractive index that bends light in the required fashion.

MRSEC researchers have developed transformations based on non-orthogonal coordinate systems to



Work performed by D.-H. Kwon and D. Werner in IRG4 of the Penn State MRSEC Center for Nanoscale Science, under DMR-0213623.

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structures can generate a near-zero refractive index that bends light in the required fashion.

MRSEC researchers are developing such low-index materials, and have also developed transformations based on non-orthogonal coordinate systems to design cloaks of arbitrary asymmetrical shape. These same techniques enable us to surround any electromagnetic system that we simulate with a perfectly absorbing bubble, so that stray light doesn't spuriously bounce off the artificial edges of the simulation cell.