5005-C1-33 **Bedros Afeyan*** (bedros@polymath-usa.com), 827 Bonde Court, Pleasanton, CA 94566, and **Kirk Won**, **Mathieu Charbonneau-Lefort** and **Jean Luc Starck**. *Exploiting Sparsity and Morphological Diversity Extraction in Inertial Confinement Fusion Research.*

We will highlight a series of results from the fruitful application of sparsity, multiresolution analysis, and harmonic analysis ideas and methods in the field of inertial confinement fusion. In particular, we will consider methods of characterizing annular shell target surfaces, radiation symmetry and hydrodynamic instabilities during implosions using redundant libraries of functions, efficient algorithms based on sparsity pursuit and morphological diversity extraction.

Starting with full sphere data r(theta, phi) using atomic force microscopy (spheremapper), to small disk/patch sequences of optical interferometric data (phase shifting spherical diffraction interferometry, PSSDI), to 16 channel precision radiography X ray transmission data, and X ray phase contrast imaging characterization of very thin ICE layers, we will demonstrate to what extent modern tools and ideas of harmonic analysis have systematized and expanded the technical feasibility of achieving laser fusion by revealing precisely the condition of annular capsules, the hohlraums (radiation cages), the radiation nonuniformity imprint and the hydrodynamic instabilities during implosions on the road to inertial fusion energy power production. (Received May 28, 2007)