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Star Sampling!

Traditionally, the experimental study of stars has been the domain of the astronomer. With the discovery of presolar dust grains (such as graphite, silicon carbide, microdiamonds, and corundum) in primitive meteorites that have survived the formation of the solar system intact a new kind of laboratory based astronomy is developing. It is generally believed that these grains condensed in stellar outflows before being incorporated into the meteoritic material of our solar system, and that the elemental and isotopic compositions of these grains preserve a nucleosynthetic record of their parent star. Measurements of the elemental composition and isotopic anomalies in these grains provide important new information both about stellar nucleosynthesis and about the conditions during circumstellar grain formation. These stardust samples will shortly be supplemented with stellar wind collection coupons returned by the Genesis Space Craft.

The measurement of these stellar samples is extremely difficult since it involves trace analysis (at the ppb level) on samples containing only a few thousand atoms of the target element. Instrumentation pioneered at ANL represents the only method for such analyses. Recently, a new apparatus has been put into operation at ANL's fourth generation light source. Using this unique vacuum ultraviolet light source, the new instrument is intended to allow isotopic measurement of the isotopic composition of our sun, thus providing key experimental evidence as to the early evolution of our solar system.

Dr. Michael J. Pellin is a senior scientist and the Deputy Division Director of the Materials Science Division at ANL. He came to ANL from the University of Illinois in 1978 where he received his Ph.D. in Physical Chemistry. His work includes an DOE Energy 100 Award, a University of Chicago Distinguished Performance Award, an IR 100 Award, and a titular membership in IUPAC.