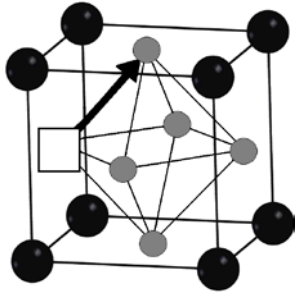


PHYSICS AND ASTRONOMY COLLOQUIUM

TUESDAY, SEPTEMBER 8, 2009

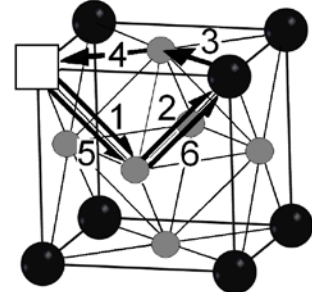
TUESDAY, 4:10 PM, WEBSTER B17, WSU PULLMAN

New insight into diffusion mechanisms in compounds



Gary S. Collins

Professor of Physics
WSU Pullman



Diffusion, or atom movement, helps to equilibrate solids, redistribute dopants and bring solute atoms to their preferred lattice sites. It occurs most often by a vacancy mechanism, in which an atom jumps into an empty, neighboring lattice site. For binary compounds, there are two types of vacancies and diffusion may be mediated by either type. In highly ordered compounds, vacancies need to avoid producing lattice disorder as they jump. As a consequence, elegant sequences of jumps have been envisioned that preserve order, in a kind of “atomic step dance”. Recently, we studied diffusion by measuring jump frequencies of probe atoms in a series of In_3R (R= rare earth) line compounds having the Cu_3Au structure (see diagrams) [1]. As I will show, one can determine which of the two vacancies contributes predominately to diffusion by measuring jump frequencies at the two boundary compositions of the phase. Indeed, a change in mechanism was discovered along the above series. This method offers new insight into diffusion mechanisms that is unavailable in other ways. Results of recent jump frequency studies on other phases will also be surveyed.

[1] Gary S. Collins, Xia Jiang, John P. Bevington, Farida Selim and Matthew O. Zacate, *Phys. Rev. Lett.* 102, 155901 (2009).

Come meet the speaker over coffee and refreshments from 3:45-4:10 pm in the foyer on floor G above the lecture hall. All Welcome. Host: Chuanwei Zhang