

Joint EPS/ Astronomy Colloquium
Thursday, September 13 2007

***DYING STARS AND LIVING WORLDS: SHORT-
LIVED RADIONUCLIDES AND THE ABUNDANCE OF
PLANETARY WATER***

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Searches for extrasolar planets are now extending into the regime of objects not much more massive than the Earth, and the expectation that many such planets will be detected by new missions and instruments raises the obvious question of how many of them will be Earth-like. An important event in our Solar System's early history was the injection of short-lived radionuclides, probably from one or more nearby massive stars. One of these, aluminum-26, was a significant source of internal heat in planetesimals and growing protoplanets; indeed, there is compelling evidence for melting and differentiation of some meteorite parent bodies within the first million years of Solar System history. Heat from the decay of short-lived radionuclides would have driven hydrothermal circulation and alteration in such bodies and others have proposed that the boundary between "dry" and "wet" material in the present Solar System was set by the time-scale of accretion vs. the half-life of Al-26 (720 kyr). However, studies of the star formation process and the time-scale of dissipation of planet-forming disks suggests that initial inventories of short-lived radionuclides vary between disks by orders of magnitude, and that the majority of systems would have received much less Al-26 from their birth environment. This has consequences for the abundance of planetary water in these systems and their propensity to host Earth-like planets.

4:00 PM, 2 LeConte Hall

3:30 PM, Tea in 661 Campbell Hall