

School of Physics and Astronomy

SEMINAR

The Dynamical Quest to Conquer Earth's Space Junk Problem



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Among the earliest problems in astrodynamics were those concerned with the motion of an artificial satellite in the gravitational field of the oblate Earth; and their solutions in the hands Brouwer, Kozai, and others were intimately bound with the rigorous development of artificial satellite theory. These considerations placed emphasis on the construction of increasingly more accurate analytical theories, in the style of our forebears, valid in idealized situations or on short mission timescales. Such an approach was of course justified by the need of astrodynamical practice, but in recent years astrodynamics has had to face new problems concerning the long-term motion of space debris which forced it to abandon the somewhat utilitarian investigations mentioned above.

Like the exotic orbital configurations of many exoplanetary systems, the three-dimensional complex of man-made orbiting debris, brought on by unfettered space activities, has stimulated a renewed interest in applied and fundamental research in celestial dynamics. Despite their reputed normality, Earth satellite orbits can possess an extraordinarily rich spectrum of dynamical phenomena, from stable resonant configurations to significant chaotic drifts in circumterrestrial phase space throughout their orbital lifetimes. This talk will review these intriguing dynamical phenomena in the Earth orbiter problem and highlight their deeper connections with current aspects of dynamical astronomy. One particularly compelling ideology is based on the judicious use of the resulting instabilities to prescribe natural Earth re-entry itineraries to remedy the space debris problem or to navigate the phase space.

Date:	Thursday 15 th August
Time:	3pm
Venue:	L1, Large Seminar Room 107, 10 College Walk, Clayton

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