



Orbit Propagation and Estimation of Non-Cooperative Space Objects under Sensing Uncertainty



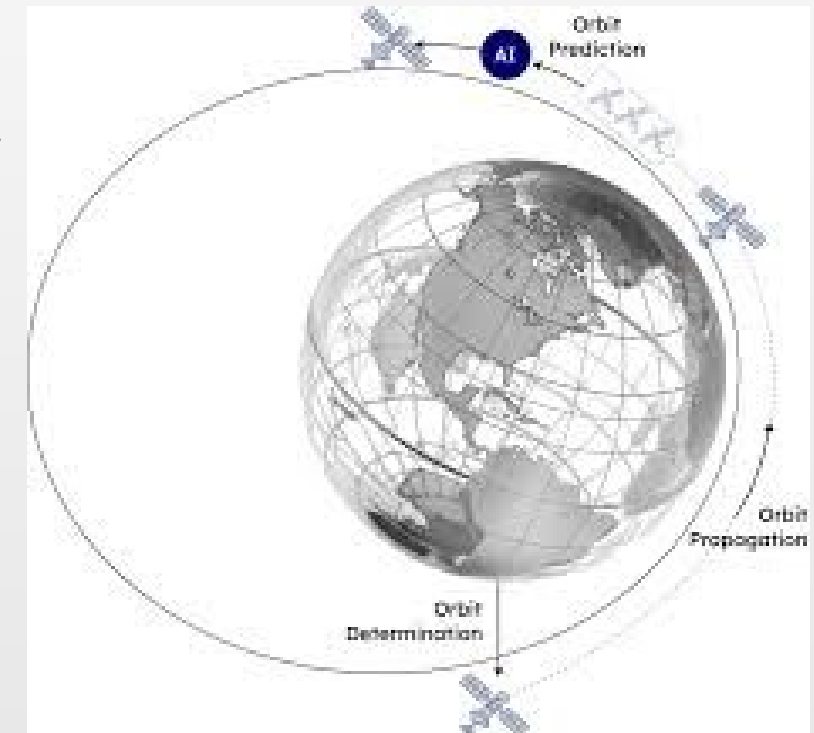
Prof. Xiaoli Bai

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Location: **Sala de Seminarios, Piso 2, DIE.**

Time: Wednesday **20 May 12:00**

Biography: Dr. Xiaoli Bai is an Associate Prof., Department of Mech. and Aerospace Engineering at Rutgers, The State University of New Jersey. She received her Ph.D. in Aerospace Engineering from Texas A&M University. Her research focuses on astrodynamics & space situational awareness, spacecraft guidance, navigation, and control, space robotics, and thermospheric density prediction. Dr. Bai was elected an Associate Fellow of the American Institute of Aeronautics and Astronautics (AIAA) in 2021.



Abstract: This talk presents an uncertainty-aware Physics–ML fusion framework for orbit propagation, which integrates physics-based modeling with machine learning. The framework leverages empirical physical models as structured priors while learning model corrections from data. The resulting approach improves prediction accuracy and provides calibrated uncertainty estimates, which are critical in space situational awareness. The estimation of unknown, non-cooperative space objects during proximity operations is also presented. This integrates a nonlinear filtering backbone with structured data-driven models that capture the characteristics of rigid-body motion.

