

About the Library

AstDyn (Asteroid Dynamics) is a high-fidelity C++ library designed for the precise orbit determination and propagation of celestial bodies, specifically focusing on Main Belt asteroids and Near-Earth Objects (NEOs).

Developed within the **ITALOccult** project, this software represents the state-of-the-art in computational astrodynamics, aimed at reducing ephemeris uncertainties to sub-milliarcssecond levels for accurate stellar occultation predictions.

Key Features:

- **Rigorous Dynamics:** Relativistic models (EIH) & JPL DE441 perturbations.
- **High-Order Integration:** Adaptive Runge-Kutta-Fehlberg 7/8 (RKF78).
- **Precision:** Validated against NASA/JPL Horizons ($\pm 2\text{m}$ accuracy).
- **Comprehensive Tools:** From coordinate transformations (IAU 2006) to differential correction.

This manual serves as the definitive reference for researchers, astronomers, and software engineers.

AstDyn

Scientific Reference Manual

Michele Bigi

AstDyn

Scientific Reference Manual of the C++ Library

*The ITALOccult Framework for High-Precision
Asteroid Dynamics & Occultation Prediction*

