Modeling and Integrating the Orbit of Near-Earth Asteroid 2003 QB90 (242211)

Fang, David (School: Oregon Episcopal School)

Near-Earth asteroids can pose serious dangers to life on Earth. The location of near-Earth asteroid 2003 QB90 (242211) was measured over a four week period (July 9, 2017-August 5, 2017) using telescopes at the Leitner Family Observatory and Planetarium at Yale, Siding Spring Observatory, and the SMARTS Consortium. An orbit model of the asteroid was then determined through the Method of Gauss and optimized using a hill-climbing optimizer in order to predict its possible imminent danger to Earth. The (Cartesian) orbital state vectors (centered around the Sun) and (Keplerian) osculating orbital elements were calculated: position = (0.46084, -1.2373, -0.48851); velocity = (0.82337, 0.58488, 0.15065); epoch = JD 2457948.04329; eccentricity = 0.53384±0.05; perihelion = 1.2336±0.05 AU; semi-major axis = 2.6462±0.1 AU; inclination(?) = 5.2883±0.05; ascending node(?) = 128.43±0.1; argument of perihelion(?) = 210.50±0.05. A long-term REBOUND integration orbit model of the asteroid for 10,000 years outputs an estimated prediction of 1.46188*10^-6AU (˜220km) for the closest distance to Earth, a distance that warrants concern.

Awards Won: