CENTRIPETAL FORCE FROM GRAVITY

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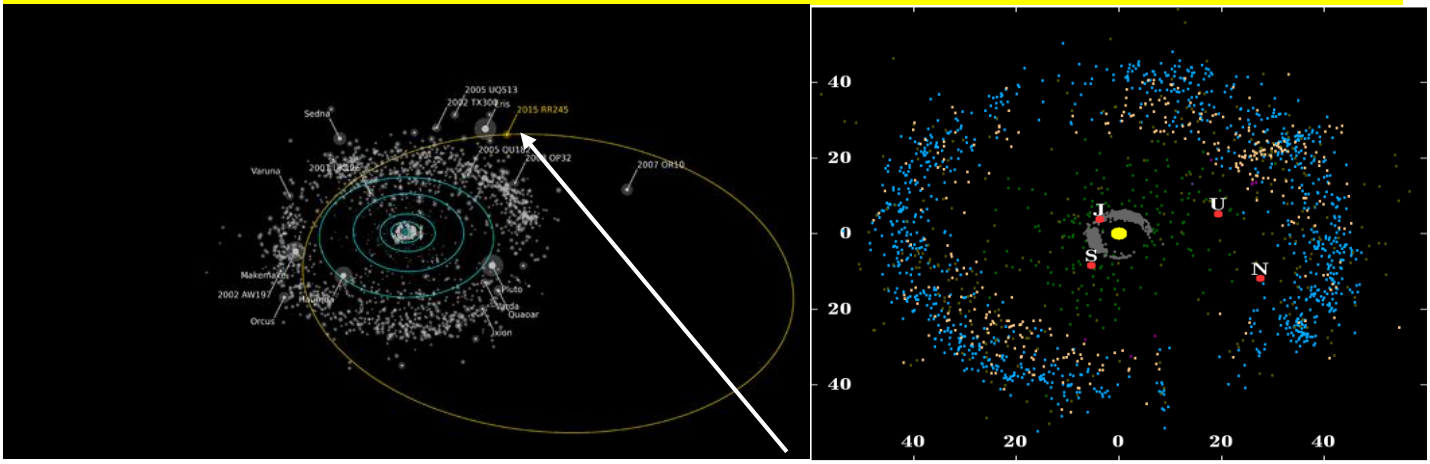
Astronomers Discover New Likely Dwarf Planet, Latest of Many



A rendering of the orbit, shown in orange, of 2015 RR2245, the latest likely dwarf planet to be discovered in the solar system's Kuiper Belt. Its path around the sun takes about 700 years. The blue circles show the orbits of the major planets.

The neighborhood beyond Neptune is becoming ever more crowded, with astronomers announcing this week the discovery of **another likely dwarf planet**.. In the year since NASA's New Horizons spacecraft flew past Pluto, planetary astronomers continue to make new discoveries in the Kuiper belt and what it might reveal about the earliest days of the solar system. **More than 100 bodies in the solar system, all but one located along the ring of icy debris beyond Neptune, appear to meet the definition of a dwarf planet, a category that the astronomical union created to describe Pluto as well as Ceres, the largest asteroid, and Eris, a Kuiper belt object slightly smaller than Pluto.**

The new object, designated 2015 RR245, was first spotted in February as the astronomers looked through images taken five months earlier. Further observations a few weeks ago confirmed the object's **700-year loping path around the sun.** The astronomical union has been slow to designate new dwarf planets, adding just two since 2006: Haumea and Makemake. But there is a slew of additional Kuiper belt objects larger than Mimas.If the 435-mile diameter is accurate, 2015 RR245 would rank as just the 19th largest potential dwarf planet. Larger objects include Quaoar, Orcus, Salacia and still-unnamed objects with temporary designations like "2007 OR10" and "2002 MS4."

INTRODUCTION: Purpose of this application is to find mass of our sun (known to be 1.989 X 10^{30} kg.) using the period (T) of this NEW found dwarf planet RR245 and its Wikipedia found elliptical maximum (120 AU) and minimum (34 AU) distances from the sun. 1 AU (astronomical unit) = 1.5 X 10^{11} m . Finding the mass of our sun is made possible by equating gravity as the force which causes the centripetal force here. Kepler's 3rd Law
Thus, $G m M/R^2 = m v^2/R$, and $v = R \omega$ where $\omega = 2\pi/T$, solving for M yields: $M = [4\pi^2/G](R^3/T^2)$

QUESTIONS: (a) Find R in AUs? R is mean of minimum + maximum elliptical orbit distances from the sun. Thus, R = (minimum + maximum)/2. (b) Find R in units of meters? (c) Convert 700 year period (T) into seconds?, (d) Find mass of our sun using R & T for this recently found dwarf planet RR245?, (e) How well does calculated mass of sun compare with NASA found sun mass of 1.989 X 10^{30} kg. ?

HINTS: G = gravitational constant = 6,67 X 10^{-11} N $m^2/kg.^2$, 24 hrs./day, 365 days/ year, 3600 s./hr.

ANSWERS:(a) 77 AU , (b) 1.155 X 10^{13} m. , (c) 2.2075 X 10^{10} s., (d) 1.873 X 10^{30} kg. , (e) Using maximum and minimum distances dwarf RR245 is from sun and it's 700 yr. period, computed and NASA stated mass of sun came out quite close. Differences of 1.989 vs 1.873 X 10^{30} are due to T & R still not exact. (-: