

2005 YU₅₅

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Goldstone radar image of asteroid 2005 YU₅₅
taken November 7, 2011.

Discovery^[1]

Discovered by	R. S. McMillan Steward Observatory, Kitt Peak (691)
Discovery date	December 28, 2005

Designations

MPC designation	2005 YU ₅₅
Minor planet category	PHA ^[2] Apollo ^[2]

Orbital characteristics^[2]

Epoch 2010-Jul-23 (JD 2455400.5)
(Uncertainty=1)^[2]

Aphelion	1.6329 AU (Q)
Perihelion	0.65241 AU (q)
Semi-major axis	1.1427 AU (a)
Eccentricity	0.42905
Orbital period	1.22 yr
Mean anomaly	26.094° (M)
Inclination	0.51351°
Longitude of ascending node	39.304°
Argument of perihelion	268.79°

Proper orbital elements

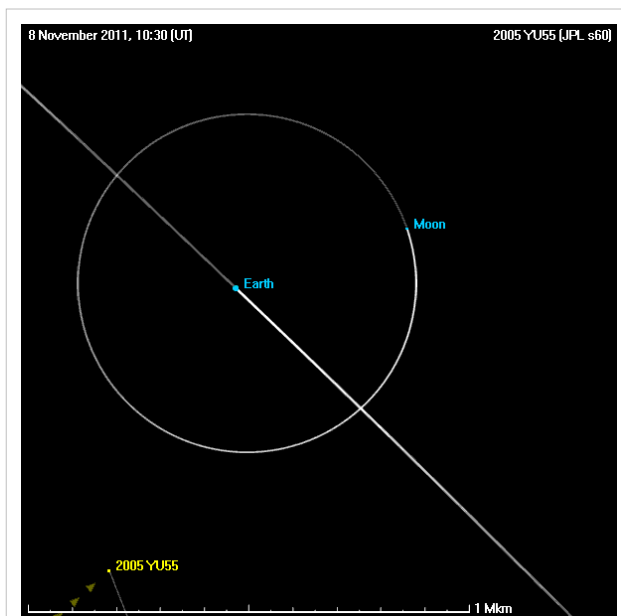
Physical characteristics

Dimensions	400 meters ^{[3] [4]}
Sidereal rotation period	18 hr ^{[2] [5]}

Spectral type	C-type ^[3]
Absolute magnitude (<i>H</i>)	21.9 ^[2]

2005 YU₅₅, also written as **2005 YU55**, is a potentially hazardous asteroid^[2] approximately 400 meters (1,300 feet) in diameter.^{[4] [3]} It was discovered on 28 December 2005 by Robert S. McMillan at Steward Observatory, Kitt Peak.^[1] On 8 November 2011 it passed 0.85 lunar distances (324,600 kilometers; 201,700 miles)^[1] from the Earth. This is the closest known approach by an asteroid with an absolute magnitude this bright since 2010 XC₁₅ (*H* = 21.4) approached within 0.5 lunar distances in 1976.^[5]

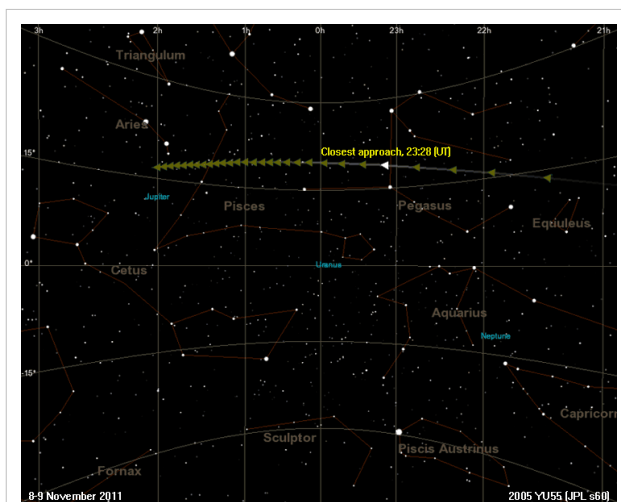
Impact risk assessment



Trajectory of asteroid 2005 YU₅₅ compared with the orbits of the Earth and the Moon on 8–9 November 2011.

In February 2010, 2005 YU₅₅ was rated 1 on the Torino Scale, indicating that a pass near the Earth is predicted that poses no unusual level of danger. On 19 April 2010, highly accurate radar targeting by the Arecibo radio telescope reduced uncertainties about the orbit by 50%.^[4] This improvement eliminated any possibility of an impact with the Earth within the next 100 years.^[4] It was removed from the Sentry Risk Table on 22 April 2010 and as such it now has a rating of 0 on the Torino Scale.^[2]

On 8 November 2011 at 23:28 UT the asteroid safely passed 0.844 lunar distances (324,600 km; 201,700 mi) from the Earth.^[1] On 9 November 2011 at 07:13 UT the asteroid passed 0.623 LD (239,500 km; 148,800 mi) from the Moon.^[3] During the close approach the asteroid reached about apparent magnitude 11,^{[3] [4]} and would have been visible to experienced observers using high-end binoculars with an objective lens of 80+ mm if it were not for bright moonlight preventing a true dark sky. Since the gibbous moon did interfere with the viewing,^[5] observers trying to visually locate the asteroid required a telescope with an aperture of 6 inches (15 centimeters) or larger.^{[5] [1]}



Apparent trajectory on 8–9 November 2011.

The next time a known asteroid this large will come this close to Earth will be in 2028^[5] when (153814) 2001 WN₅ passes 0.00166 AU (km; mi) from the Earth.^[3]

According to Jay Melosh, if an asteroid the size of 2005 YU₅₅ (~400 m across) were to hit land, it would create a crater 6.3 km (3.9 mi) across, 518 m (1699 ft) deep and generate a

seven-magnitude-equivalent-earthquake.^[5] If an asteroid such as (144898) 2004 VD₁₇ (~580 m across) were to impact land, it would produce a crater about 10 km (6.2 mi) wide and an earthquake of magnitude 7.4.^[6] The chances of an actual collision with an asteroid like YU55 is about 1 percent in the next thousand years.^[5]

Study

During the 2011 passage 2005 YU₅₅ will be studied by radar using Goldstone, Arecibo, the Very Long Baseline Array, and the Green Bank Telescope.^[5] The Herschel Space Observatory will make far-infrared measurements of 2005 YU₅₅ on November 10, helping determine its temperature and composition.^[7]

Radar analysis will also help to pin down the asteroid's albedo, or diffuse reflectivity. Although radar measurements do not detect visible light they can determine the distance and size of an object with a high degree of accuracy. This information, coupled with visible light measurements, provides a more accurate measure of an object's absolute magnitude, and therefore its albedo.

Future trajectory

On 19 January 2029, 2005 YU₅₅ will pass about 0.0023 AU (km; mi) from Venus.^[3] The close approach to Venus in 2029 will determine how close the asteroid will pass the Earth in 2041.^[5] The uncertainties in the post-2029 trajectory will cause the asteroid to pass somewhere between 0.002 AU (km; mi) and 0.003 AU (km; mi) from the Earth in 2041.^[5] Radar astrometry in November 2011 should clarify the Earth encounter situation in 2041 and beyond.^[5] As of 7 November 2011, the nominal solution shows 2005 YU₅₅ passing 0.1 AU (km; mi) from the Earth on 12 November 2041.^[3]

References

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- [5] Elizabeth K. Gardner (October 31, 2011). "Large asteroid to pass by Earth Nov. 8, but what if it didn't?" (<http://www.purdue.edu/newsroom/research/2011/111031T-MeloshAsteroid.html>). Purdue University. . Retrieved 2011-11-07.
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External links

- Orbital simulation (<http://ssd.jpl.nasa.gov/sbdb.cgi?sstr=2005YU55;orb=1>) from JPL (Java) / Horizons Ephemeris (http://ssd.jpl.nasa.gov/horizons.cgi?find_body=1&body_group=sb&sstr=2005YU55/)
- Live Webcast: Keck Telescope To Watch Asteroid Flyby (http://www.keckobservatory.org/news_preview/live_webcast_keck_telescope_to_watch_asteroid_flyby/) (Ustream video)
- 2005 YU55 Observing Campaign (<http://www.minorplanet.info/ObsGuides/YU55/>)
- Close, but no Cigar: The Flyby of Asteroid 2005 YU55 (<http://minorplanetcenter.net/blog/close-but-no-cigar-the-flyby-of-asteroid-2005-yu55/>) (MPC blog with flyby simulated animations)
- Orbital simulation of 2005 YU55 (http://www.nasa.gov/images/content/541440main_2005_YU55_approach.gif) in an animated GIF image provided by nasa.gov

- NASA Asteroid Q&A (on YU55) (<http://www.ustream.tv/recorded/18250783>) (November 1, 2011)
 - Arecibo saves us from another potentially hazardous asteroid (<http://planetary.org/blog/article/00002463/>) (Emily Lakdawalla Apr. 29, 2010)
 - No, 2005 YU55 won't destroy the Earth (<http://blogs.discovermagazine.com/badastronomy/2011/05/09/no-2005-yu55-wont-destroy-the-earth/>) (Phil Plait 9 May 2011)
 - Asteroid 2005 YU55 will zip by Earth next week (<http://www.usatoday.com/tech/science/space/story/2011-11-01/asteroid-viewing-tuesday/51035012/1>)
 - The Passage of Asteroid 2005 YU55 & How to See It. (<http://astroguyz.com/2011/11/05/the-passage-of-asteroid-2005-yu55-how-to-see-it>) (David Dickinson November 5, 2011)
 - Photos of flyby and Observation guide (<http://www.global-rent-a-scope.com/aartscope/2011/11/7/2005-yu55-passes-inside-1-lunar-distance-nov-8th-2011.html>) (Peter lake November 8, 2011)
 - Rotation Simulation at Nasa.Gov (http://www.nasa.gov/multimedia/videogallery/index.html?collection_id=77341&media_id=120141271)
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