



"Planet Killer" Asteroid 415029 (2011 UL21)

Khalil M*, Said M, Ibrahim A, Elserwi H, Salah N, Ahmed F and Mostafa B

Faculty of Engineering, October University for Modern Sciences and Arts (MSA), Egypt

***Corresponding author:** Mohamed Khalil, Faculty of Engineering, October University for Modern Sciences and Arts (MSA), Giza, Egypt, Email: mkibrahim@msa.edu.eg

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Abstract

Since January 1, 1900, asteroid 415029 (2011 UL21) is considered one of the top 10 largest asteroids that have passed within 7.5 million kilometers from Earth. This asteroid belongs to the Apollo group of asteroids, and it is classified as a potentially hazardous Asteroid (PHA). This paper presents a concise overview of the gigantic asteroid 2011 UL21 that was discovered in 2011 by the Catalina Sky Survey (CSS). Additionally, we try to highlight the physical properties of that giant space rock, including its size, speed, and composition.

Keywords: Asteroid 415029 (2011 UL21); Planet Killer; Apollo-class asteroids; Catalina Sky Survey; Near-Earth Objects

Abbreviations

CSS: Catalina Sky Survey; NEOs: Near-Earth Objects; PHA: Potentially Hazardous Asteroid; NASA: National Aeronautics and Space Administration.

Introduction

Asteroid 415029 (2011 UL21) is a potentially hazardous asteroid. It is an Apollo class asteroid discovered in 2011 by the Catalina Sky Survey (CSS). This asteroid is known as planets killer due to its huge size, as it is one of the largest near-Earth objects (NEOs) [1] ever detected, and it is classified as a "potentially hazardous asteroid" (PHA) [2-11]. Although the mountain-size 'Planet Killer' asteroid is larger than 99% of all known near-Earth asteroids, it does not currently pose a threat to Earth. Since its discovery in 2011, its trajectory has been carefully monitored. On June 27, 2024, asteroid 2011 UL21 passed past Earth at a distance of 6.6 million kilometers (17 times the distance between Earth and the Moon). Its next closest approach will be in 2089 (about 2.7 million kilometers near Earth). This year's close

approach gave astronomers and scientists a rare chance to examine and study such a massive NEO. NASA's planetary radar has discovered a secret moon orbiting nearby asteroid 2011 UL21 after the last close approach to Earth [12]. The rest of the paper is organized as follows: In Section 2, some features of asteroid 415029 (2011 UL21) are presented, while in Section 3, we explore its composition and origin. In Section 4, we try to answer the question, What would happen if 2011 UL21 hit Earth?.

Some Features of Asteroid 415029 (2011 UL21)

The massive asteroid 2011 UL21 is estimated to have an absolute magnitude of 15.9, a diameter of 2.3 km, and an optical albedo of $pV=0.16$ [12]. It travels at a speed of roughly 93,000 km/h (about 25 km/s); it takes 3 years to complete a full revolution around the Sun. It is possible that the object's quick rotation is the reason for its almost spherical shape, as indicated by the limited recorded light curve amplitude. NASA's planetary radar has discovered a secret moon orbiting nearby asteroid 2011 UL21 after the last close approach to Earth (Figure 1).