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Artistic impression of the AE Aquarii binary system  
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## Strange White Dwarf Disguises in a Pulsar

### *White dwarf has pulsar-like features*

White dwarfs are believed to be the remnant of a stellar core, after a supernova explosion, which would slowly cool and evaporate as time goes by, but this theory might be soon scrapped as observations made with the Suzaku X-ray space telescope reveals a new type of white dwarf presenting some strange features that have been associated, in the past, with pulsar activity. So far, there has been at least one positive discovery of such an object in the AE Aquarii, that seems to present similar behavior to the pulsar situated in the Crab Nebula. The newly discovered white dwarf emits high-energy X-ray radiation while it rotates around its axis, making it the first white dwarf of its kind. Crab Nebula is the remnant debris of a massive supernova explosion of a star at the end of its life. Both pulsars and white dwarfs are born in the core of dead stars, due to the principle of action and reaction which compresses them and compacts the matter during the supernova phase, leaving behind objects with a size comparable to that of the planet Earth but with a mass similar to that of the Sun. Usually, white dwarfs are extremely hot and could possibly reach up to 150,000 Kelvin, but, due to their origin, they lack the fuel to power nuclear fusion reactions and lose heat into space, cooling in a few billion years to become a so-called black dwarf. On the other hand, pulsars or neutron stars require more massive stellar cores to form, such as stars having a mass between 1.3 to 2.1 that of the Sun. Stars with masses ranging between 2 to 3 times that of the Sun may become quark stars, anything larger than 5 solar masses ultimately creates a gravitational collapse, thus a black hole. Pulsating neutron stars, or pulsars, radiate high amounts of radio and X-ray wavelengths in patterns similar to the light given off by lighthouses as they rotate on their axis. The team conducting the study on the chosen white dwarf were hoping in witnessing the process in which the star is cooling by emitting subatomic particles at relativistic speeds, which stream through the Earth's atmosphere from time to time and produce the Cherenkov radiation emissions. Occasionally, some white dwarfs may present some strange characteristics, such as incredibly powerful magnetic fields that gives them the capability of producing these cosmic ray emissions. This was also the case of AE Aquarii which is composed of a binary system, consisting of a white dwarf and a normal star, from which gas is spiraling towards the dead star giving off low and high-energy X-ray emissions. The unique pattern of the high-energy X-ray emissions was used to determine that the white dwarf was spinning at a rate of about two rotations per minute, giving it characteristics very similar to the pulsar located in the Crab Nebula. The processes which takes place during X-ray radiation and subatomic particles emission are mostly unknown, albeit physicists theorize that the lighthouse-like beam of X-ray is controlled by the powerful magnetic field of the white dwarf that captures the charged particles, and ejects them as they gather enough energy to travel through space at relativistic speeds. Although presenting pulsar-like features, the AE Aquarii white dwarf is merely an equivalent to the respective object due to its powerful magnetic field. Most of the time, white dwarfs are relatively quite in the X-ray domain, but emit high quantities of low-energy subatomic particles.