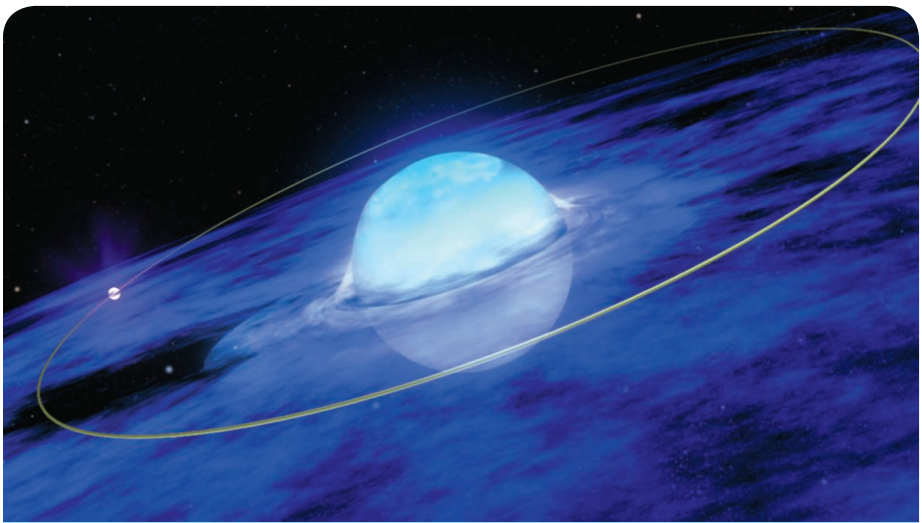
EDITED BY GILBERT CHIN AND MARIA CRUZ



ASTRONOMY

Superorbital Variability

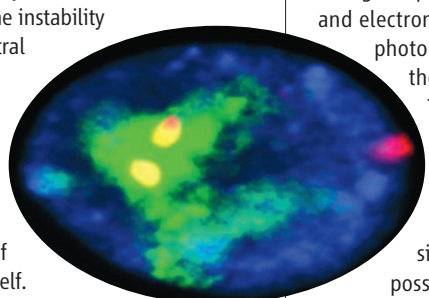
Many stars live in pairs, and sometimes they form rather intriguing binary systems. LS I +61°303 is one such case, where a Be star 10 times as massive as the Sun and a compact object orbit around their common center of mass. Be stars are rapidly rotating B-type stars that show hydrogen Balmer emission lines in their spectrum and lose mass to an equatorial circumstellar disk. The nature of the compact object in LS I +61°303 is unknown, but it is suspected to be a neutron star. The system has been detected across the electromagnetic spectrum all the way from radio to gamma rays, and it has been shown to be highly variable across all frequencies. At most wavelengths, the flux of LS I +61°303 is known to be modulated by the orbital period of about 26.5 days; at radio, x-ray, and optical frequencies, the flux is also modulated on a longer time scale, or superorbital period, of 1667 days. Based on data from the Fermi Gamma-ray Space Telescope, Ackermann *et al.* show that the gamma-ray emission of LS I +61°303 also varies according to the superorbital period. This modulation is more prominently seen at orbital phases around apastron (the point at which the stars in the binary are farthest apart), which could be explained by a quasi-cyclical evolution of the equatorial outflow of the Be star. The authors suggest that gamma-ray observations such as these could be used to study the ouflows of massive stars in eccentric binary systems. — MJC

Astrophys. J. **773**, L35 (2013).

CANCER

Gains in Cancer Epigenetics

With the recent discovery that genes that code for chromatin-modifying enzymes are mutated in human cancers, interest in the oncogenic role of these epigenetic regulators has intensified. Adding a twist to this story is a new study showing how aberrant overexpression of the wild-type (that is, nonmutated) version of an epigenetic regulator can also contribute to the development of tumors. Black *et al.* found that the gene for KDM4A, a histone lysine demethylase, is reproducibly amplified in several tumor types, most notably in ovarian cancer. In order to investigate the functional consequences of this amplification, the authors studied a cell culture model in which KDM4A was overexpressed. Surprisingly, KDM4A overexpression produced transient gains in the number of copies of specific genomic regions, especially at chromosome 1q12 as measured by fluorescence in situ hybridization, but did not cause global genome instability as assessed by spectral karyotyping. In primary tumors, the regions amplified in a KDM4A-dependent manner correlated with amplification of the KDM4A gene itself. The authors hypothesize that the elevated level of this chromatin-modifying enzyme enhances the recruitment of the DNA replication machinery and leads to a repeated replication of some genomic regions, which produces a selective gain in copy number. These findings reveal an unexpected mechanistic link between epigenetic regulation and genomic instability, a hallmark of cancer cells. — PAK



Cell **154**, 541 (2013).

SIGNAL TRANSDUCTION

When a Half-Life Isn't

A common tactic for measuring the rate of turnover of proteins in cells is to block the synthesis of new proteins by treating the cells with cyclohexamide, a drug that gums up the ribosomal assembly line that churns out proteins. But Dai *et al.* warn that this methodology only works if cycloheximide treatment does not itself affect the rate of protein degradation. Cells are autonomously regulated machines; as such, they can detect environmental insults and launch a stress response. In human embryonic kidney cells, the authors found that inhibiting protein synthesis with cyclohexamide led to the activation of the protein kinase AKT (also called protein kinase B). Among the many targets of AKT are the ubiquitin ligases MDM2 and Skp2. These enzymes promote protein degradation, and phosphorylation by AKT stimulates their activity. Thus, at least for certain proteins, inhibiting protein synthesis can increase the rate of protein degradation. — LBR

J. Biol. Chem. **288**, 10.1074/jbc.M112.445148 (2013).

PHYSICS

Controlling Power Flow

Optoelectronic devices lie at the heart of the technology industry. Shrinking the size (and increasing the operation speed) of the devices are often limited by the optical components, whose sizes generally exceed many tens of wavelengths. Surface plasmons are collective electronic excitations induced by photons interacting with a metal, effectively confining the light to subwavelength dimensions and offering the possibility of bridging the optical and electronic size gap. Much effort in nanophotonics is geared toward controlling the directional flow of plasmons. To this end, Davoyan and Engheta present a theoretical study that combines plasmonic nanostructures with magneto-optical elements. Their numerical simulations show that it may be possible to control the energy flow of the plasmons in such a hybrid structure, thereby providing a possible route to manipulating light at the nanoscale. — ISO

Phys. Rev. Lett. **111**, 047401 (2013).

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