Galileo turns star-gazer

Peter Bond reports on a surprising astronomical triumph for a seasoned planetary observer.

The veteran satellite Galileo, which has the primary role of studying Jupiter and its moons, has now played a key role in the identification of Delta Velorum, one of the 50 brightest stars in the sky, as a variable star.

In June 2000, the spacecraft’s star tracker “lost” the star for about eight hours. During checks of the instrument, Galileo engineer Paul Fieseler began to suspect that the star’s behaviour – rather than the satellite’s equipment – was to blame.

A search through archived data revealed a similar episode in November 1989 when the instrument measured a brief dip in the same star’s brightness.

Fieseler’s request for assistance from the American Association of Variable Star Observers eventually led to a reply from Argentinean amateur astronomer Sebastian Otero who had seen Delta Velorum dim on four occasions since 1997.

With the aid of Christopher Lloyd (Rutherford Appleton Laboratory, Didcot), they were able to calculate the 45-day rhythm of the dimming events. Predictions of the next two events were confirmed.

Delta Velorum is one of approximately 150 bright stars that Galileo’s star tracker is programmed to recognize. It is thought to be a multiple star system, a tight grouping of at least five stars.

However, the pattern of dimming indicates that what had been regarded as the brightest individual member of the group is actually two stars of similar brightness that periodically transit each other’s disks.

On each occasion, the total brightness declines by about 30%.

New list of RAS members

A new list of Royal Astronomical Society members will be published in August 2001. Some personal details in the current list are out of date or inaccurate.

Would all members please make sure that the Membership Secretary is made aware of any corrections to their details? This check is particularly important for e-mail addresses.

Making stars and γ-ray bursts

A mechanism for producing γ-ray bursts involves and may even trigger star formation, Peter Bond reports.

New findings from NASA's X-ray observatory Chandra and the Italian satellite BeppoSAX suggest that γ-ray bursts arise where stars are forming.

“We know that when a γ-ray burst explodes, it produces a blast of material called a fireball, which expands at relativistic speeds like a rapidly inflating bubble,” said Luigi Piro (Istituto di Astrofisica Spaziale, CNR, Rome). “Our team found evidence that the blast wave caused by the fireball brakes against a wall of very dense gas, which we believe is the crowded region where stars form.”

The first hint that γ-ray bursts can occur in such regions came during a Chandra observation of an afterglow on 26 September 2000. Gordon Garmire (Pennsylvania State University) found X-ray emission to be greater than that expected by the standard scenario of a fireball in a low-density medium. Then, on 22 February 2001, Chandra was pointed towards one of the brightest bursts ever observed by BeppoSAX to observe the afterglow.

These results followed previous studies by BeppoSAX and Chandra of four other gamma-ray bursts in which the data indicated an expanding fireball that encountered an extremely dense gas. The properties of this gas suggest that it originated from a very massive progenitor before it exploded as a γ-ray burst.

Piro believes that these observations support the hypernova model, in which a supermassive star evolves extremely rapidly within a dense star-forming region. The hypernova explosion may occur in the same stellar environment that originally produced the massive star itself, and perhaps may trigger even more star formation.

John Williams (1797–1874) was the Assistant Secretary of the Royal Astronomical Society from 1846 till his death, and a dedicated employee of the Society. A man of wide interests, including Egyptian hieroglyphics, numismatics and geology, he was the Secretary of the former Spitalfields Mathematical Society from 1823 until the remaining members and their Library were subsumed into the RAS in 1846.

Williams was a pioneer in the study of early Chinese records of sunspots, eclipses and comets, his most notable work being Observations of Comets, from BC 611 to AD 1640, extracted from Chinese Annals, published in 1871.

In those far off days the Assistant Secretarieship of the Society was a residential appointment, the present Monthly Notices office and Spencer Room being sitting and dining rooms and the BAA Library and Grove Hills Room (ex-London Mathematical Society office) being bedrooms. Before the move from Somerset House to Burlington House, attempts were made to induce Williams to retire, but he refused. His wife died suddenly after 52 years of marriage in November 1874 and the loss brought on heart disease, to which he succumbed less than a month later. Williams was also involved with other learned societies, being a Fellow of the Society of Antiquaries, the London (Royal) Photographic Society, and was also Assistant Secretary of the (Royal) Microscopical Society. The photograph seen here shows him with such an instrument, and was lent to the Society for copying by Mrs Joan Barton, a descendant of John Williams, through the good offices of Prof. G Lé Turner.

P D Hingley is the Librarian of the Royal Astronomical Society.

References