sheet; as expected from its trajectory, it was never far enough from the SM equator to reach the low flux polar cap region.

The characteristic electron energy in the cool plasma sheet (Fig. 3*b*) observed in both Mercury I and III is ~ 100–200 eV, whereas in the hot plasma sheet observed in Mercury I it is at least ~ 1 keV; these energies are of the same order of magnitude as those observed in the corresponding regions of the Earth's plasma sheet. The fact that the plasma sheet energies in both magnetospheres are comparable implies that the plasma sheet energy does not scale with the electric potential difference across the magnetospheric tail, the value of which for Mercury should be about one-seventh of that for the Earth[3]; this has important implications for the still unsolved problem of the origin of the plasma sheet.

In summary, well defined bow shock and magnetospheric boundary crossings were observed on the inbound and outbound trajectories during Mercury I and III. The locations of the boundaries observed are mutually consistent with locations obtained from models which scale the Earth's magnetosphere to Mercury I data[1,4] and the other magnetospheric features are consistent with the magnetic field model[4]. Thus, the plasma results strongly support the idea that Mercury's magnetic field is intrinsic rather than induced, and show that the magnetosphere of Mercury is remarkably similar to that of the Earth.

R. E. HARTLE
K. W. OGILVIE
J. D. SCUDDER

*NASA Goddard Space Flight Center,*
*Greenbelt, Maryland 20771*

H. S. BRIDGE
G. L. SISCOE
A. J. LAZARUS
V. M. VASYLIUNAS

*Center for Space Research,*
*Massachusetts Institute of Technology,*
*Boston, Massachusetts 02139*

C. M. YEATES

*Jet Propulsion Laboratory,*
*Pasadena, California 91103*

Received April 5; accepted April 14, 1975.

1 Ogilvie, K. W., *et al.*, *Science*, **185**, 145 (1974).
2 Ness, N. F., Behannon, K. W., Lepping, R. P., Whang, Y. C., and Schatten, K. H., *Science*, **185**, 151 (1974).
3 Siscoe, G. L., Ness, N. F., Yeates, C. M., *J. geophys. Res.* (in the press).
4 Ness, N. F., Behannon, K. W., Lepping, R. P., and Whang, Y. C., *J. geophys. Res.* (in the press).

# Possible identification of Ariel 1118−61

THE transient X-ray source Ariel 1118−61 has been discovered by Ariel V (refs 1, 2) and the best estimate for the position is (1950.0) $\alpha$ = 11 h 18 min 59s, $\delta = -61° 35.3'$. We point out here the presence in the error box of the long period Mira-type variable RS Cen (1950.0) $\alpha$ = 11 h 18 min 16.5 s, $\delta = -61° 36.0'$. It has been suggested that in the Mira-type variables o Ceti (Mira) and SY For, the blue variable companion is a white dwarf illuminated by infalling material accreted from the strong wind of the M-type star[3–5]. The similarity between these systems and the (recurrent) nova T CrB has also been stressed[5]. We propose that some transient X-ray sources are binary systems consisting of a compact object in orbit around a long period variable. The accretion rate of material on to the compact object in such a system[4] is $\lesssim 10^{-8} M_{\odot}\mathrm{yr}^{-1}$ which is just the rate required to produce X rays from a compact object. We note, too, the proposed identification[6] of another transient X-ray source (2U1543−47) with a variable late-type giant.

The large variability of radius and luminosity of a Mira-type star is likely to produce strong modulation of the stellar wind and a similar modulation of the accretion rate on to and thus luminosity of the compact object. A similar correlation between stellar wind strength and luminosity of the X-ray object has been proposed for Cen X-3 (refs 7, 8). We expect the modulation to be much stronger for Mira-type stars.

The transient source A1118−61 was observed to peak in mid-December 1974. The period of RS Cen is[9] 164.51 d and the X-ray source appeared at phase ~ 0.4 (optical maxima occur at phase 0.0 and minima at 0.54) of the cycle when the radius of RS Cen is expected to reach a maximum. We intuitively expect mass outflow to be greatest near light minimum, when absorption bands are strongest in the stellar atmosphere. If the proposed identification is correct we expect the transient X-ray source to appear 'regularly' with a period of 164 d. Eclipses of the compact object by the red variable may complicate this prediction: the orbital period for such a system is $\gtrsim$ 2 yr. We would associate the 6.75 min periodicity of the X-ray object with the rotation (or possibly precession) period of the compact object[10].

The identification of A1118−61 with RS Cen would establish the identity of a new class of X-ray binaries. Such systems would offer a unique opportunity to study the structure and dynamics of the atmospheres and winds of Mira-type variables.

We thank Drs F. Rosenberg, P. Sanford and G. Skinner for communicating results in advance of publication.

A. C. FABIAN
J. E. PRINGLE
R. F. WEBBINK

*Institute of Astronomy,*
*Madingley Road, Cambridge CB3 0HA, UK*

Received April 7; accepted April 17, 1975.

1 Ives, J. C., Sanford, P. W., and Bell-Burnell, S. J., *Nature*, **254**, 578 (1975).
2 Eyles, C. J., Skinner, G. K., Willmore, A. P., and Rosenberg, F. D., *Nature*, **254**, 577 (1975).
3 Fernie, J. D., *Astrophys. J.*, **130**, 611 (1959).
4 Warner, B., *Mon. Not. R. astr. Soc.*, **159**, 95 (1972).
5 Feast, M. W., *Observatory*, **95**, 19 (1975).
6 Forman, W., Liller, W., *Astrophys. J. Lett.*, **183**, L117 (1973).
7 Giacconi, R., *Seventh Texas Symposium on Relativistic Astrophysics* (New York Academy of Sciences, in the press).
8 Jackson, J. C., *Mon. Not. R. astr. Soc.* (in the press).
9 Kukarkin, B. V., *et al.*, *First Supplement to the third edition of the general catalogue of variable stars* (Astron. Council Acad. Sci. USSR, Moscow, 1975).
10 Fabian, A. C., *Mon. Not. R. astr. Soc.* (in the press).

# Observations of low energy gamma-ray bursts with SAS-2

Low energy celestial gamma ray bursts were discovered[1] in 1973 and the detection later confirmed by several groups. In this paper we report the low energy gamma-ray bursts observed by the plastic scintillator anticoincidence dome of the Small Astronomy Satellite-2 (SAS-2) gamma-ray telescope. Although the high energy gamma-ray telescope of SAS-2 has a threshold of about 20 MeV, the large SAS-2 anticoincidence dome (A-dome), which is the outermost element of the instrument, provides a very large detector for the high energy portion ($\geqslant$0.3 MeV) of these burst events.

Details of the instrument are given by Derdeyn *et al.*[2]. The A-dome, constructed out of 1.5 cm thick scintillator has an average collection area of about $2.5 \times 10^3$ cm$^2$ and is an almost omnidirectional detector, only being insensitive to directions within a small cone (~30° half angle) centred around the direction that it is attached to the spacecraft. The average effective threshold for detection over the dome is about 0.15 MeV, the average efficiency rising to about 20% at 0.6 MeV. The counting rate of the A-dome is accumulated and read out every 768 ms. When there is no increase resulting from the trapped radiation in the Atlantic anomaly, the observed rate is about $4.2 \times 10^3$ counts s$^{-1}$ and it remains quite steady. (The Earth's trapped radiation extends downward to unusually low altitudes in the central