OPTICAL IDENTIFICATIONS OF FAINT X-RAY SOURCES: NEW CCD CANDIDATES FOR 0918-549, 1822-000 AND 1905+000*

C. Chevalier and S.A. Ilovaisky
Observatoire de Besançon
41bis Av. de l'Observatoire
25044 Besançon Cedex
France

ABSTRACT. We present preliminary results of multicolor CCD imaging within the error boxes of several unidentified faint galactic X-ray sources. New, faint ultraviolet stars have been found lying within the combined SAS-3/HEAO A-3 error boxes of Reid et al. (1980) for 0918-549, 1822-000 and the X-ray burster 1905+000.

1. INTRODUCTION

Among weak galactic X-ray sources with reasonably accurate positions (=<1 arc min), mostly from SAS-3 and HEAO-1 A-3 observations, ten or so do not have identified optical counterparts (Bradt and McClintock 1983). While some of these lie at low galactic latitudes and may be visually absorbed, at least six have |b|>2.5°. For none of them has a deep systematic search actually been conducted, although Grindlay (1981) reported some hitherto unconfirmed results. With the availability of CCD cameras on large telescopes, it has become possible to obtain UBVRI photometry of all objects brighter than 22nd magnitude lying within the error boxes. We report here briefly the results of observations of three such sources obtained in 1984.

2. OBSERVATIONS AND RESULTS

Most of the images were obtained with the cassegrain CCD camera of the 2.2m ESO/MPI telescope at La Silla, Chile, on 6-7 May 1984. Additional images of 1822-000 and 1905+000 were obtained with the prime focus CCD camera of the 3.6m CFH telescope at Mauna Kea, Hawaii on 17 Sept 1984.

* Based on observations collected at the European Southern Observatory, La Silla, Chile.
1 Visiting Astronomer, Canada-France-Hawaii Telescope, administered by NRC of Canada, CNRS of France and U. of Hawaii

The new candidate we have selected for 0918-549 on the basis of UBVR images lies within the combined SAS-3/HEAO-A3 error box of Reid et al. (1980) and Dower et al. (1978), approximately 4" E of star 13 of Dower et al. A fainter, red star is found 2" NE of our candidate. The faint star previously suggested by Grindlay (1981), located 6" NE of star 15 of Dower et al., shows colors typical of a late K dwarf and it should no longer be considered as a likely candidate.

Similar images have been obtained for the combined SAS-3 (Doxsey et al.), and HEAO-A3 (Reid et al.) error boxes of 2S1905+000 and 2S1822-000 and in each case an ultraviolet star has been found within the combined box. Charles (private communication) confirms our candidate for 1905+000 is consistent with the Einstein HRI position for that source. Our 1822-000 candidate, which is 7" N of star F of Reid et al., is still tentative as the U-band CFH images are slightly underexposed. In any case the previous candidate reported by Grindlay, star F itself, is intrinsically red and should be disregarded. Preliminary magnitudes and colors for two of our candidates are:

<table>
<thead>
<tr>
<th>Source</th>
<th>V</th>
<th>B-V</th>
<th>U-B</th>
<th>A_v</th>
<th>B_o-m_x</th>
</tr>
</thead>
<tbody>
<tr>
<td>0918-549</td>
<td>21.0</td>
<td>0.4</td>
<td>-0.6</td>
<td>1.2 mag</td>
<td>22.3</td>
</tr>
<tr>
<td>1905+000</td>
<td>20.1</td>
<td>0.8</td>
<td>-0.4</td>
<td>2.4</td>
<td>21.0</td>
</tr>
</tbody>
</table>

4. DISCUSSION

Assuming intrinsic colors typical for an accretion disk-dominated system, i.e., \((U-B)_o = -1.0\) and \((B-V)_o = 0.0\) (van Paradijs 1983) we have obtained the crude estimates of the interstellar extinction given in Table 1. These are in good agreement with the evaluations of foreground reddening by Neckel and Klare (1980) in those directions.

Taking as average X-ray fluxes for 0918-549 and 1905+000: 10 uJy (Dower et al.) and 20 uJy (Doxsey et al.) respectively, we obtain the 'optical-to-X-ray' color indices \(B_o-m_x\) (van Paradijs 1982) given in Table 1. These values fall in the range typical of burster-type low mass X-ray binaries (21.3-22.3) with very high \(L_x/L_{opt}\) ratios. Finally, setting an upper limit to the distance of 15 kpc gives \(M_v >= 3.9\) and 1.8 for 0918-549 and 1905+000 respectively. The latter is compatible with the estimates made by van Paradijs (1983) for X-ray bursters, while the value for 0918-549 would indicate either a subluminous accretion disk, or a very distant halo object.

A complete account of this work will appear elsewhere.