Identification of faint X-ray sources composing Galactic Ridge X-ray Emission by Subaru/MOIRCS

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The Galactic Ridge X-ray Emission (GRXE)

- It seemingly extended hard (≥ 2 keV) X-ray emission along the Galactic plane which has been known since early 1980’s (e.g., Worrall et al. 1982)
- High temperature thermal X-ray emission (~10^8 K)
- Strong Fe K lines (highly-ionized ion lines and neutral line)
Origin of the GRXE

- ~1Ms X-ray deep observation at the Galactic Bulge → ~80% of the GRXE at around Fe lines resolved into faint X-ray point sources (Revnivtsev et al. 2009)

- Candidate Population
  - Active binary (Revnivtsev et al. 2006)
  - Magnetic Cataclysmic Variables (Hong et al. 2012)

- Since interstellar absorption is significant toward Galactic Bulge, only CVs within a 2 kpc distance are accessible within optical survey (Motch et al. 2010) → NIR observation is necessary.

To proceed the origin of the GRXE, we carried out to identify dim X-ray sources using Subaru/MOIRCS and to know the nature of them with X-ray and NIR.
We found that $\sim 47\%$ (256 of 533) of X-ray sources in the MOIRCS field have NIR counterpart (false positive fraction: $\sim 17\%$)

<table>
<thead>
<tr>
<th>Telescope/Instrument</th>
<th>Subaru/MOIRCS</th>
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<tbody>
<tr>
<td>Obs. Region</td>
<td>(RA, Dec) = (17:51:27.86, -29:35:31.4)</td>
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<tr>
<td>Exp. Time</td>
<td>$\sim 25$ min (J, Ks), $\sim 30$ min (H)</td>
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<tr>
<td>Obs. Date</td>
<td>2012-05-08</td>
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<tr>
<td>airmass</td>
<td>1.535-1.762</td>
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<td>COADD</td>
<td>4 (J, Ks), 5 (H)</td>
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</tbody>
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We compared the flux ratio of each source between X-ray and NIR ($F_X/F_{\text{NIR}}$) with typical ratio of candidate sources such as magnetic CVs, non-magnetic CVs etc.

The flux ratio of X-ray and NIR indicates that the main population constituting the GRXE in hard-band is **non-magnetic CVs, hibernating CVs, and pre-CVs (not mainly magnetic CVs).**

Please see poster P46