

ミラ型変光星を用いた銀河系ハロー形成史への制限

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Limits on Galactic halo traced by Mira variable stars

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Abstract

We present the spatial distribution of the Mira variable stars (Miras) in the Galactic halo up to 100 kpc. We make a sample of 196 red stars in the Galactic latitudes $b > 30^\circ$, and perform repeated observations over 3 years by 105-cm telescope at Kiso Observatory. We discover 16 Mira variable stars. We find that many of these Miras are located near the Sagittarius (Sgr) stream, as opposed to the spatially unbiased sample. We also detect one or two Miras toward the metal-poor Sextans dSph.

Key Words: Galactic halo, Mira

1 Introduction

Old stellar populations (~ 13 Gyr) are dominant in the Galactic halo, and they elucidate that the halo have many large-scale stellar streams like the Sgr streams (e.g., Yanny et al. 2000). In contrast, the intermediate-age (1–10 Gyr) stars are minor population in the halo, and their spatial distribution still remains unclear. Mira variable stars are one of luminous intermediate-age populations, and their period-luminosity relation provides relatively accurate distance estimate (e.g., Itaya & Matsunaga 2011). Thus, we explore the Miras in the halo, and determine the 3-D spatial distribution of the intermediate-age population.

2 サンプルと観測

The first targets are selected using $J-H > 0.7$, $H-K_s > 0.3$ on the 2MASS catalog and $g-r > 0.8$, $r-i > 0.3$ on the SDSS catalog in the Galactic latitudes $b > 30^\circ$. The second target was one of the stars that show large photometric variation in the QUEST1 (QUasar Equatorial Survey Team, Phase 1) variability survey (Rengstorf et al. 2009). We perform repeated observations of 223 targets over 3 years in I_c -band by 105-cm telescope at Kiso Observatory.

3 結果

We detect 16 Miras with periods longer than 100 days and the I_c amplitude, $\Delta I_c > 1.0$. Fig. 1 shows the spatial distribution of the Miras. We find that although the monitoring targets are unbiased to the regions of the known stellar streams, many of them are located near the known Sgr stream in $X < 20$ kpc. We also detect one Mira and a long-period, relatively small amplitude ($\Delta I_c = 0.8$) star toward the metal-poor Sextans dSph ($[Fe/H] \sim -2.0$).

The distances and radial velocities support that they are associated with the Sextans dSph. In addition, one Mira is detected near the Sgr stream discovered at 90 kpc (Newberg et al. 2003).

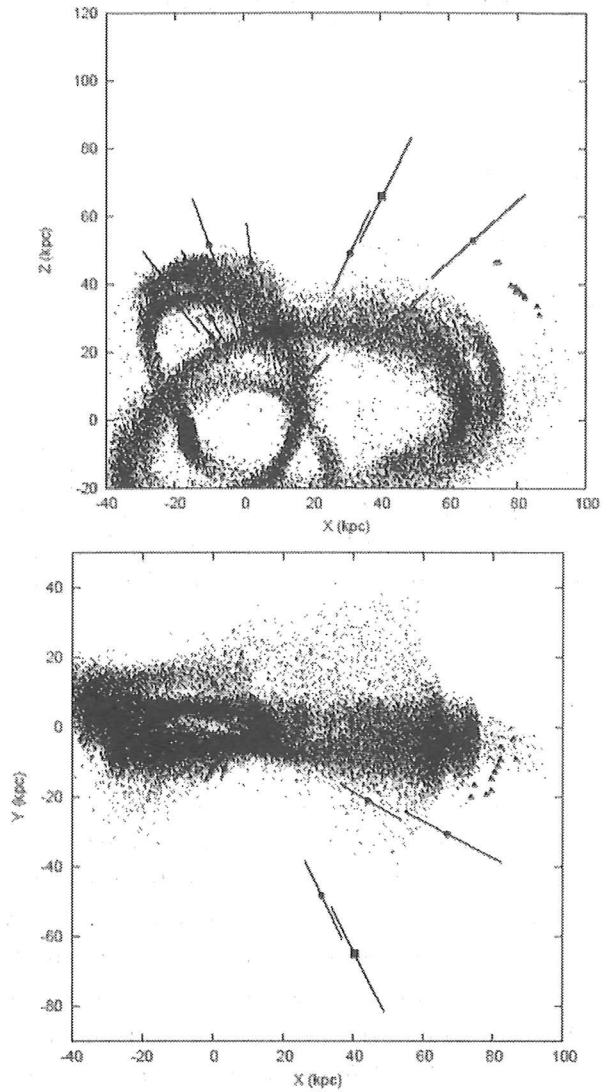


Fig1 Filled circles denote Miras that have the amplitude $\Delta I_{\text{c}} > 1.0$, whereas a filled square show a long-period and relatively small amplitude ($\Delta I_{\text{c}} = 0.8$) star. Filled triangles and small dots show the Sgr stream at 90 kpc and that predicted by Law et al. (2005).

参考文献

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