

# Resolved Kinematics of Runaway and Field OB Stars in the Small Magellanic Cloud

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We use GAIA DR2 proper motions of the RIOTS4 field OB stars in the Small Magellanic Cloud (SMC) to study the kinematics of runaway stars. The data reveal that the SMC Wing has a systemic peculiar motion relative to the SMC Bar of  $(v_{\alpha}, v_{\delta}) = (62 \pm 7, -18 \pm 5)$  km/s and relative radial velocity  $+4.5 \pm 5.0$  km/s. This unambiguously demonstrates that these two regions are kinematically distinct: the Wing is moving away from the Bar, and towards the Large Magellanic Cloud with a 3-D velocity of  $64 \pm 10$  km/s.

This is consistent with models for a recent, direct collision between the Clouds.

We present transverse velocity distributions for our field OB stars, confirming that unbound runaways comprise on the order of half our sample, possibly more.

Using eclipsing binaries and double-lined spectroscopic binaries as tracers of dynamically ejected runaways, and high-mass X-ray binaries (HMXBs) as tracers of runaways accelerated by supernova kicks, we find significant contributions from both populations.

The data suggest that HMXBs have lower velocity dispersion relative to dynamically ejected binaries, consistent with the former corresponding to less energetic supernova kicks that failed to unbind the components.

Evidence suggests that our fast runaways are dominated by dynamical, rather than supernova, ejections.

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Comments:

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