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First Results from Project SUNBIRD: Supernovæ UNmasked By Infra-Red Detection

Poster on-line

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Abstract. Measurements of current rates of core-collapse supernovæ (CCSNe) suffer from significant uncertainties, probably due to the large fraction of CCSNe that explode in crowded regions which have bright background emission and significant dust extinction. Conventional optical (seeing-limited) SN surveys generally fail to detect them, but including them is crucial to the accurate determination of CCSN rates. Project SUNBIRD aims to tighten the present constraints on the fraction of CCSNe that are missed by conventional SN surveys. We are monitoring more than 25 dusty luminous infrared galaxies that are actively star-forming, for evidence of dust-obscured CCSNe, in an effort to characterise the population of CCSNes exploding in those nuclear regions of dusty LIRGs. We observe in the near-infrared, which is less affected by dust extinction compared to the optical; we are using Gemini South and Keck, and we make use of state-of-the-art laser guide-star adaptive optics instruments to achieve a spatial resolution $<0''.1$, which is sufficient to resolve close to the galactic nucleus.

During the project's first year we discovered three CCSNe and one candidate one, with nuclear offsets as small as 200 pc, as cited in the poster. Aggregating the new discoveries with the CCSNe found in previous programmes employing AO, we compared the distribution of nuclear offsets of AO CCSN discoveries with all other documented CCSNe discovered in LIRGs. The poster showed that our method is singularly effective at uncovering CCSNe in the nuclear regions of LIRGs, and that while optical surveys dominate SNe discoveries far from a galaxy's centre, near infra-red AO observations are needed to probe the regions within 1 kpc of the nucleus.

Keywords. Supernovæ: general - galaxies: starburst - infrared: galaxies - instrumentation: adaptive optics - instrumentation: high angular resolution

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For the full poster, see http://dx.doi.org/10.1017/S1743921318002880