Wide-field dynamic astronomy in the near-infrared with Palomar Gattini-IR and DREAMS

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Event: ANZCOP, 2019, Melbourne, Australia
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\textbf{ABSTRACT}

There have been a dramatic increase in the number of optical and radio transient surveys due to astronomical transients such as gravitational waves and gamma ray bursts, however, there have been a limited number of wide-field infrared surveys due to narrow field-of-view and high cost of infrared cameras, we present two new wide-field near-infrared fully automated surveyors; Palomar Gattini-IR and the Dynamic REd All-sky Monitoring Survey (DREAMS). Palomar Gattini-IR, a 25 square degree J-band imager that begun science operations at Palomar Observatory, USA in October 2018; we report on survey strategy as well as telescope and observatory operations and will also providing initial science results. DREAMS is a 3.75 square degree wide-field imager that is planned for Siding Spring Observatory, Australia; we report on the current optical and mechanical design and plans to...
achieve on-sky results in 2020. DREAMS is on-track to be one of the first astronomical telescopes to use an Indium Galium Arsenide (InGaAs) detector and we report initial on-sky testing results for the selected detector package. DREAMS is also well placed to take advantage and provide near-infrared follow-up of the LSST.

**Keywords:** Gattini-IR, DREAMS, transients, all-sky survey, near-infrared, wide-field, Siding Spring Observatory, Palomar Observatory

### 1. INTRODUCTION

There are a large number of optical and radio all-sky monitoring surveys which detect and monitor astronomical events, and aim for localisation of gravitational wave events. However, all-sky surveys in the infrared have been limited by a number of factors including the bright sky background and the narrow field-of-view of infrared cameras. The proliferation of small aperture wide-field optical telescopes has not been repeated in the infrared due to these factors and others including cost, atmospheric transmission, and operating requirements.

We present a series of currently operating and proposed near-infrared all-sky monitoring telescopes; these are Palomar Gattini-IR, currently operating at Palomar Observatory, USA; and the Dynamic REd All-sky Monitoring Survey (DREAMS), planned for Siding Spring Observatory, Australia; the specifications for each telescope are summarised in Table 1.

<table>
<thead>
<tr>
<th>Table 1: Telescope Specifications</th>
</tr>
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<tbody>
<tr>
<td><strong>Telescope Aperture (mm)</strong></td>
</tr>
<tr>
<td>Final F/ratio</td>
</tr>
<tr>
<td>Field of view (sq. degrees)</td>
</tr>
<tr>
<td>Filter</td>
</tr>
<tr>
<td>Detector type</td>
</tr>
<tr>
<td>Pixels per array</td>
</tr>
<tr>
<td>Pixel Size (µm)</td>
</tr>
<tr>
<td>Plate scale (arcsec)</td>
</tr>
<tr>
<td>Survey depth (M&lt;sub&gt;AB&lt;/sub&gt;)</td>
</tr>
</tbody>
</table>

Palomar Gattini-IR has begun science observations and will survey the entire observable sky to a depth of 16.4 M<sub>AB</sub>, the survey is currently planned to run for two years. Palomar Gattini-IR is observing dynamic near-infrared transients and providing follow-up and localisation of astronomical transient detections. The Dynamic REd All-sky Monitoring Survey will be provide a near-infrared wide-field astronomical capability using InGaAs detectors and is well placed to capitalise on Australia’s location to provide a new infrared telescope in the southern hemisphere.

### ACKNOWLEDGMENTS

This research is supported by an Australian National University Future Fund and an Australian Government Research Training Program Scholarship. We acknowledge and greatly thank the Mt. Cuba Astronomical Foundation and all our partners for their generous support of these projects as well as Palomar Observatory and Siding Spring Observatory for the opportunity to deploy the instruments at these sites.

### REFERENCES