



2128 - The First Resolved View of Individual Star Formation Across a Spiral Arm

Cycle: 1, Proposal Category: GO

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OBSERVATIONS

<i>Folder</i>	<i>Observation</i>	<i>Label</i>	<i>Observing Template</i>	<i>Science Target</i>
Observation Folder				
	1	MIRI mosaic (On Source)	MIRI Imaging	(1) M-33
	2	MIRI mosaic (Off)	MIRI Imaging	(2) M33-OFF-POSITION

ABSTRACT

JWST Proposal 2128 (Created: Thursday, September 9, 2021 at 4:00:34 PM Eastern Standard Time) - Overview

We propose parallel MIRI and NIRCам observations of M33, the nearest low-inclination spiral galaxy to the Milky Way ($d=840$ kpc). Our primary science goal is to produce the first-ever high resolution view of star formation across a propagating spiral arm. This view allows us to quantify the timescales of star formation and stellar cluster assembly. Our observational strategy uses two-band MIRI observations (F560W and F2100W) over a 5.5 sq. kpc region spanning the southwest spiral arm of the galaxy to detect YSOs in a region with rich ISM and HST data. Parallel NIRCам observations in four bands (F090W, F200W, F360M, F444W) will simultaneously map a 6.5 sq. kpc area in center of the galaxy, resolving the full stellar population to measure spatially-resolved star formation histories, PAH cooling, and embedded stellar cluster populations. We will be able to directly answer several long-standing questions about the star formation process including: Do extragalactic and galactic approaches to measuring star formation rates agree in spiral galaxies? How long are molecular clouds quiescent? How long are they dark? Does low mass star formation precede high mass star formation? (How much) Do molecular clouds continue grow after star formation begins?

OBSERVING DESCRIPTION

We request mapping of a 5x5 dithered MIRI mosaic in F560W and F2100W toward the southwest arm of the nearby spiral galaxy M33. We will collect snapshots from NIRCам in parallel in four different filters (F090W, F200W, F360M, F444W) and our visit timing is structured so that NIRCам observations will fall on the center of the galaxy and the mosaic orientations in MIRI will efficiently cover the up and downstream regions near spiral arm. We use select parallel modes for NIRCам observations to remain under the data rate limit for observations.

Our observations include 1 off-target MIRI integration to facilitate detector calibration for any extended structure since M33 is an extended target.