

# The Narrative

# Proposals & the Narrative

- At least 2/3 of proposal ideas quality as “Good to do”
- This isn’t enough : telescope time & \$\$\$ are always more limited than the supply of good ideas.
- You need to move from:  
**“Good to do” to “Must be done”**
- This requires a really strong story, backed by a really strong argument, explained with impeccable clarity.

# I. Crafting a strong story.

1. Topic X is important and interesting.
2. But.
3. This is how we will address “But.”

A proposal is best viewed as an argument that leaves the reader believing that #1 & #2 are true and that #3 is the best way forward.

Your goal with #3: Put words in the reviewer's mouth that they can parrot back to the committee.

The Narrative – For a proposal this usually centers around a question → “the problem”

*We propose for “\*OBSERVATORY\* observations” of Molecular cores in the Monoceros molecular cloud in order to determine if they follow a power-law mass distribution with a slope similar to the IMF.*

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- Target: Monoceros molecular cloud
- Key Component: Observatory obs of molecular cores

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“Do the cores follow the IMF or not?”

# What is the Story? i.e. the “Problem/question”?

What **bigger picture** problems/questions does the **direct question** answer?

- i.e. why does the direct question MATTER?
- This is what you should be discussing in the intro of your talks.
- Ask Astro to answer the question without ChatGPT , the LPL folks to use Chat GPT.

# Possible stories:

- “How do stars form?” -- too broad
- “What is the substructure within molecular clouds?”
- “Is the substructure within molecular clouds driven by compressive or solenoidal forcing?” – or what physical processes drive the formation of substructure in mol clouds?
- **“What is the origin of the IMF?”, “Is the IMF universal”**

Your proposal would be completely different depending on your choice of story !!

# Generative AI

- *Prompt:* What is the big picture science question in the following: We propose for observations of Molecular cores in the Monoceros molecular cloud in order to determine if they follow a power-law mass distribution with a slope similar to the IMF.

ChatGPT:

- The **big-picture science question** behind this proposal can be framed as:
- “**Does the mass distribution of dense molecular cores—the immediate precursors to stars—directly set the stellar initial mass function (IMF), or is the IMF shaped later by star-formation processes?**”

# Generative AI

- *Genesis:* The big-picture question driving this proposal is: **Does the distribution of stellar masses (the IMF) originate directly from the distribution of the gas clouds that form them?**
- In simpler terms, it is asking if the final mass of a star is "pre-determined" by the initial mass of the molecular core it was born in.

# Title

- This should connect explicitly to the direct question **and** the bigger picture question or just the direct question.
- Depends on the scope of the proposal – sometimes it is more important to focus on the very big question vs the smaller (e.g. Treasury vs. Very Small proposal)

Chat GPT answers:

- “**Testing the Core Mass Function–Initial Mass Function Connection in the Monoceros Molecular Cloud**”
- “**The Mass Distribution of Molecular Cores in Monoceros: Implications for the Origin of the IMF**”
- “**Do Molecular Cores Set the IMF? A Study of the Monoceros Molecular Cloud**”

# Abstract Outline

## Facts

Importance of Facts

Probability of Impact

Problem → sets the narrative

The direct question

Goal – identify the “key component” that will solve the problem using a “target”

We propose to...

Strategy – to utilize/generate the key component , (Justify HST/JWST, explain utilizing the “target”)

Suitability

Importance of Solution

Impact within Sub Field

Broader Impact → sets the narrative

Out-of-subfield Impact – the Bigger Question

# Narrative Examples

- Determine the narrative from the Goal Statement and some of strategy
- If you are in Astronomy – use Generative AI to help you answer the Planetary Science example.
- If you are in Planetary Science – use Generative AI to help you answer the Astronomy example.

# AI Discussion:

- What chat bot did you use?
- Can AI help you to identify the big picture in a field you don't know well? Help you learn?
- Can AI help you to better understand your own science and learn to see the big picture?
- How well did AI match what the experts thought?
- Which AI bot works better?

## Astro Example 1:

What is the big picture science question in the following: We propose NIRSpec Micro-shutter assembly (MSA) observations to identify galaxies physically associated to this protocluster by targeting galaxies selected from HST observations. The MSA observations will allow us to map the 3D structure of the protocluster, measure AGN fraction of protocluster member galaxies, and characterize the physical properties of galaxies in the most dense structure yet known in the Epoch of Reionization.

# Chat GPT answer

- The **big-picture science question** behind this proposal is:
- **How do the earliest and most massive galaxy overdensities assemble, and how does dense environment influence galaxy and black-hole growth during the Epoch of Reionization?**
- More explicitly, the proposal is addressing questions such as:
- **How are protoclusters structured and evolving in 3D at very high redshift?**  
Mapping the spatial and redshift distribution reveals how large-scale structure is assembling only a few hundred million years after the Big Bang.
- **How does extreme environment affect galaxy formation and evolution during reionization?**  
By measuring physical properties (e.g., star formation, masses) in the densest known region, the study probes environmental effects at the earliest times.
- **What role do AGN play in early protoclusters and reionization?**  
Measuring the AGN fraction tests whether black-hole growth is accelerated in overdense regions and whether AGN contribute significantly to ionizing photons.
- In one concise sentence suitable for a proposal:
- **What is the nature of galaxy and black-hole growth in the densest environments during the Epoch of Reionization, and how do the first protoclusters assemble?**

# Gemini answer

- The big-picture science question driving this proposal is: **How do the universe's first massive structures form, and how does living in a dense "cosmic neighborhood" affect the growth of early galaxies and black holes?**
- Specifically, the researchers are investigating the **Epoch of Reionization**—a period less than a billion years after the Big Bang when the first stars and galaxies began to light up the dark, neutral hydrogen gas filling the universe.
- Here is a breakdown of the core scientific mysteries this study aims to solve:
- **1. The Assembly of "Cosmic Cities"**
- In the modern universe, galaxies exist in massive clusters. Scientists want to know how these "cities" began as "protoclusters." By mapping the **3D structure**, the researchers are trying to see how gravity is pulling these early galaxies together to build the largest structures in the cosmos.
- **2. Nature vs. Nurture for Galaxies**
- Does a galaxy evolve differently if it is crowded into a dense protocluster versus being alone in empty space? By characterizing **physical properties** (like star formation rates and chemical composition), they can see if the extreme density of this environment "fast-tracks" galaxy evolution.
- **3. Feeding the Beasts (AGN Fraction)**
- An **AGN (Active Galactic Nucleus)** is a supermassive black hole actively "eating" gas and glowing brightly. The researchers want to know if being in a dense protocluster forces more gas into black holes, creating more AGNs than usual. This helps explain the co-evolution of black holes and their host galaxies.
- **Summary of the "Big Question"**
- **"Does the most extreme environment in the early universe change the fundamental way that galaxies and black holes grow?"**
- Would you like me to explain more about why the **NIRSpec Micro-shutter assembly** is the specific tool needed to capture this data?

# What about Asking the AI to give you a new proposal idea?

- Will it be truly innovative?
- Will it know the details of the facility well enough to create sensible proposal?
- Could get the same proposal idea as someone else.
- You don't own or fundamentally understand the idea. – This impacts Your identity as a scientist/researcher

# So What is an Effective Title?

- Big picture: Direct problem