✂Cut along the dotted line

1 Free Action
Draw one card
or
Discard one card for +2 SP

+

3 Turn Actions (choose)
1. Draw a card
2. Play an Astronomer or Tool
3. Attempt to study an object
4. Discard for +2 SP

+

For no action cost
(as many times as you want)
- Publish a paper
- Use an Interaction Card

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Draw one card
or
Discard one card for +2 SP

+

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Draw one card
or
Discard one card for +2 SP

+

3 Turn Actions (choose)
1. Draw a card
2. Play an Astronomer or Tool
3. Attempt to study an object
4. Discard for +2 SP

+

For no action cost
(as many times as you want)
- Publish a paper
- Use an Interaction Card

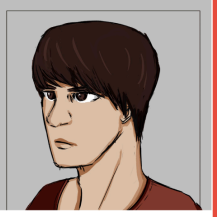
A

Brad Spool

Brad Spool, still in grad school, studies gravitational waves

A

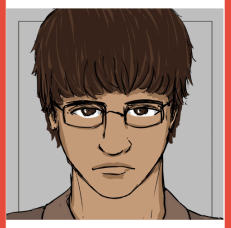
Ash Turnomer



Ash Turnomer is trying to study how charged empty space can be

A

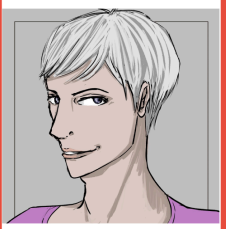
Dirk Mattel



Dirk Mattel is using radio telescopes to understand Dark Matter

A

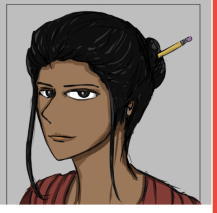
Gal Acksees



Gal Acksees studies galaxies through computer models

A

Garima Ray



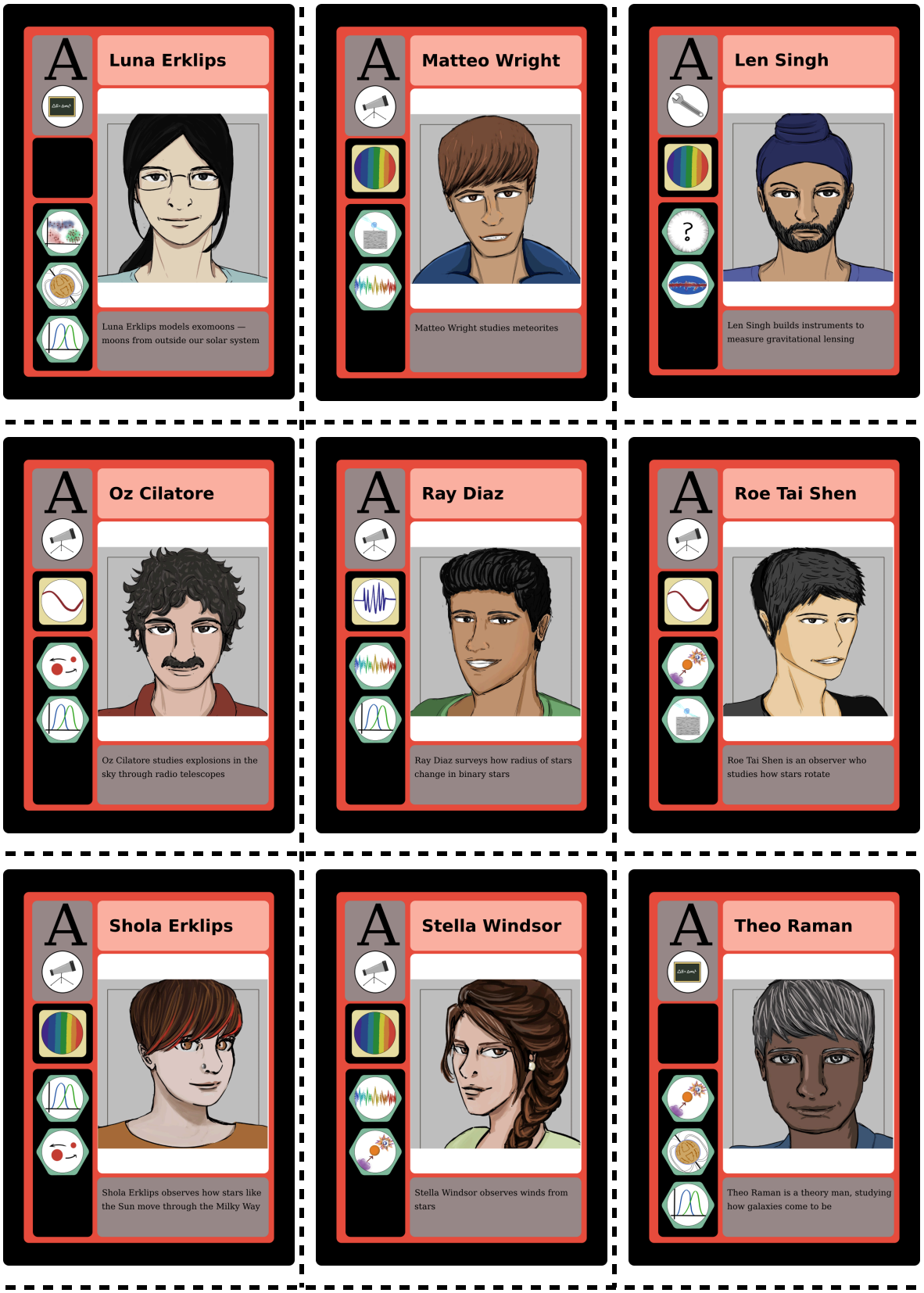
Garima Ray is trying to map the sky in gamma rays

A

Moe Sean

Moe Sean models the motion of stars in the Milky Way

✂Cut along the dotted line



✂Cut along the dotted line

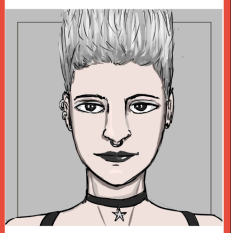
A

Yew Auftee

Yew Auftee is building a telescope to make X-ray images of stars

A

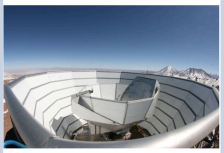
Neo Trinos



Neo trinos observes the universe in neutrinos

T

ACT



(Atacama Cosmology Telescope)
A radio telescope in Chile that helped us understand the history of our universe

T

ARO

(Algonquin Radio Observatory)
A radio telescope in Algonquin, Canada used to study outer space

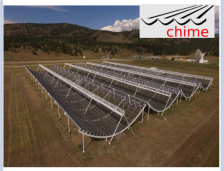
T

BOOMERanG

A balloon telescope that flew over Antarctica and sent back first measurements of the early universe

T

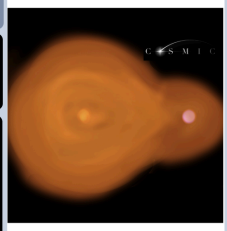
CHIME



(Canadian Hydrogen Intensity Mapping Experiment)
A radio telescope in Canada that's always looking at most of the sky

T

COSMIC



A software suite to make populations of binary stars

T

DECam

(Dark Energy Camera)
An instrument atop a telescope in Chile that helps us study Dark Energy

T

Dragonfly

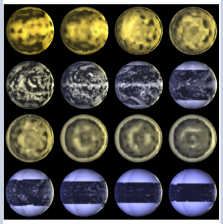
An optical telescope in New Mexico that looks at faint objects in the sky
(Logo by C. Abraham)

✂Cut along the dotted line

eRosita

A space telescope helping us understand dark energy through X-rays

ExoPlaSim



(Exoplanet Planet Simulator)
A software module that lets you make models of planets

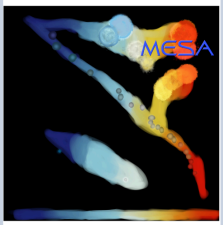
Las Campanas Observatory

A group of telescopes in Chile looking at the universe since 1969

LIGO-Virgo-KARGRA Collaboration

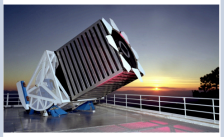
A group of instruments searching for objects that produce gravitational waves

MESA



(Modules for Experiments in Stellar Astrophysics)
A software instrument to simulate the stars

SDSS



(Sloan Digital Sky Survey)
A group of telescopes surveying and mapping galaxies, including our own!

SNO+

(Sudbury Neutrino Observatory)
An underground detector in a nickel mine looking at neutrinos

Vera C. Rubin Observatory

An observatory in Chile surveying and mapping the entire visible Southern sky (Image Credit Rubin Observatory/NSF/AURA)

— Co-work —

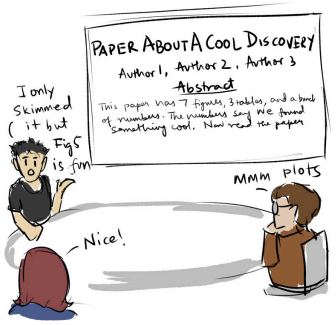
Swap hands with another player

✂Cut along the dotted line

GRAD SCHOOL

Use an Astronomer (on your field) that has already been used and a tool (on your field) to attempt to study an object

JOURNAL CLUB



Choose a player and pick a random Tool Card from their hand. (If they do not have any, you may choose another player instead)

MALFUNCTION

Use an action to discard a tool from your field (+2 SP) and take a tool from another player's field to replace it

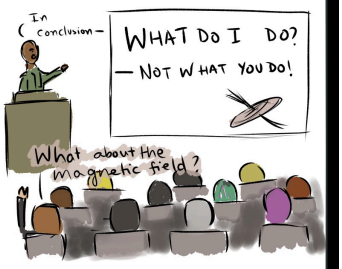
OUTREACH

Choose a player and pick a random Astronomer Card from their hand. (If they do not have any, you may choose another player instead)

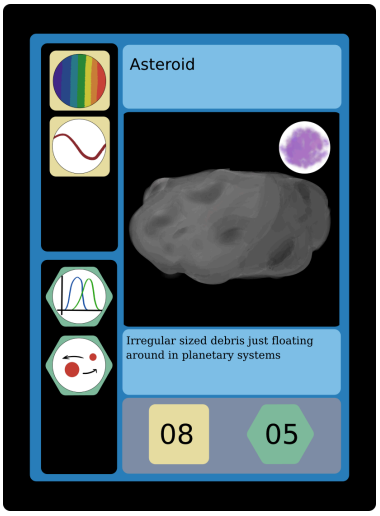
REVIEWER 2

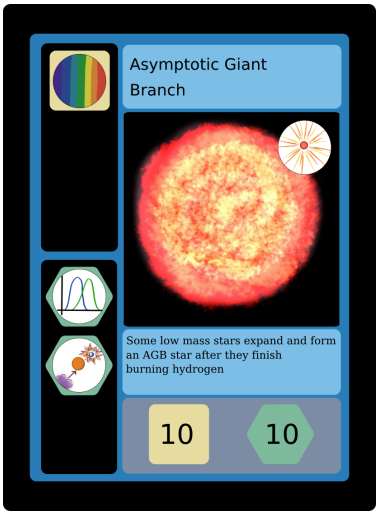
Delete up to 10 SP from another player's SP bank

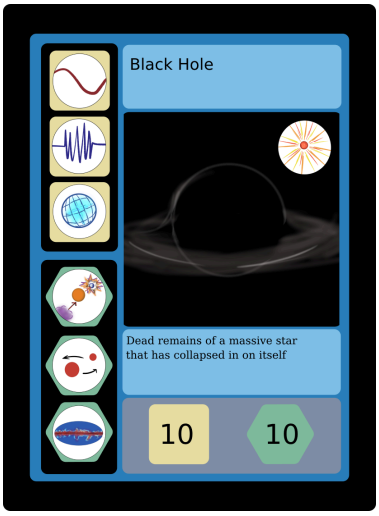
SEMINAR



Use an astronomer from your hand and tool on another player's field to attempt to study an object







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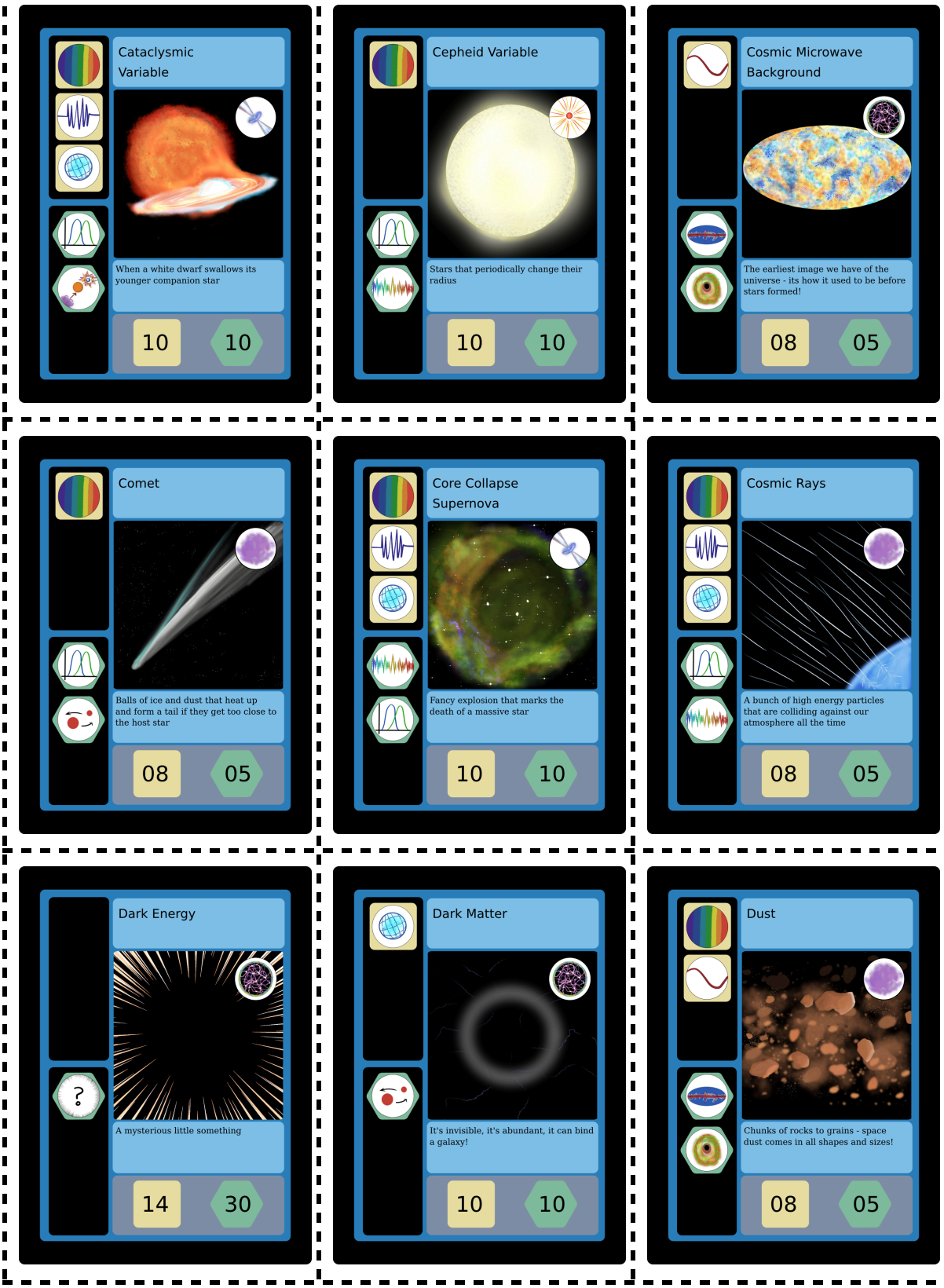
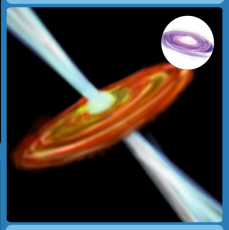


✂Cut along the dotted line

✂Cut along the dotted line

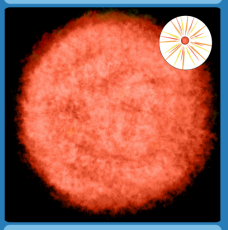
Quasar



A galaxy from the early universe

08 05

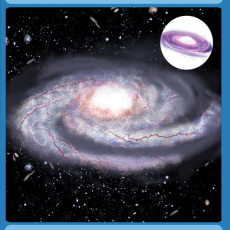
Red Supergiant



A massive star burned all its hydrogen and evolved off the main sequence

12 15

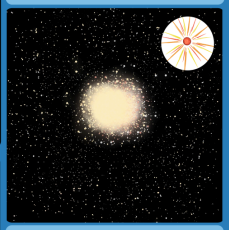
Spiral Galaxy



A galaxy that looks like a fidget spinner

08 05

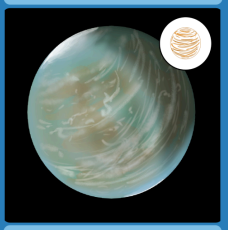
Star Cluster



Big group of stars with very little dark matter holding them together

08 05

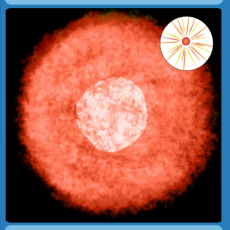
Super Earth



Planets about the mass of the Earth but bigger in size

08 05

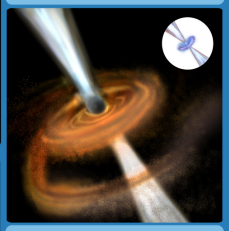
Thorne-Zytkow Object



These are the Matryoshka dolls of stars, there is a neutron star inside a massive star!

14 30

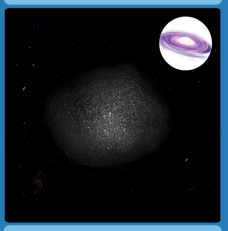
Tidal Disruption Event



When stars venture too close to a Supermassive Black Hole . . .

12 15

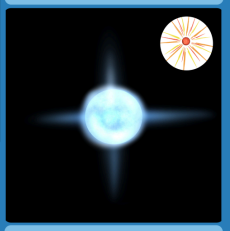
Ultra Diffuse Galaxy



A dim and spread out galaxy

10 10

White Dwarf

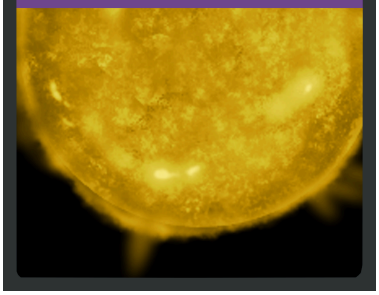


Dead remains of a low mass star that has almost collapsed in on itself but is being held by electrons

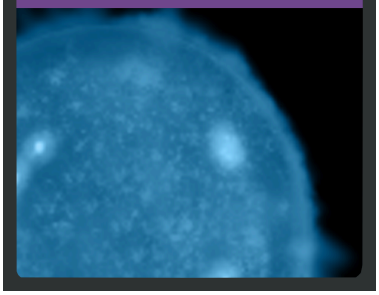
08 05

✂Cut along the dotted line

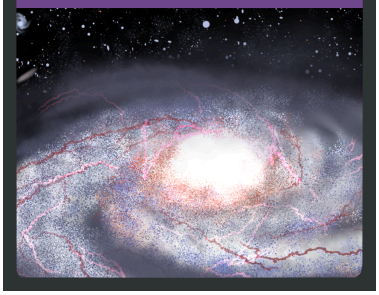
Astromania
20 SP
Stars like the Sun smash hydrogen to create helium and light
Different stars might be smashing different elements



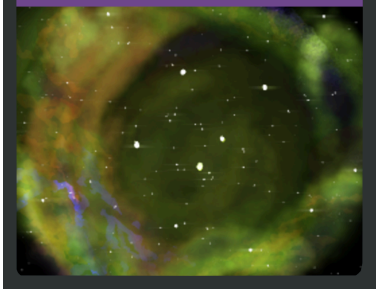
Astromania
20 SP
Stars are balls of extremely hot and charged gas
Young stars are made of mostly hydrogen



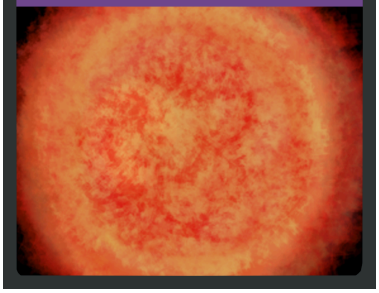
Astromania
20 SP
Scientists find a Supermassive Black Hole at the Center of our Galaxy
Astronomers say we are no exception, nearly every galaxy has one



Astromania
20 SP
Massive stars die in dramatic explosions called a 'Supernova'
These explosions can outshine a whole galaxy!

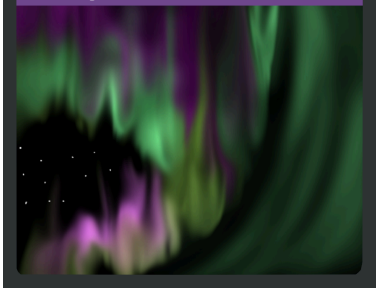


Astromania
20 SP
Some of the largest stars are more than a thousand times bigger than the Sun
These big stars are called 'Supergiants'

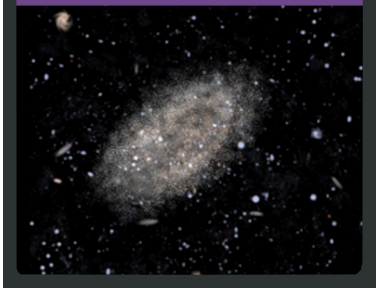


Astromania
20 SP
Hydrogen is the most abundant material in the universe, followed by Helium
The rest is just 'metals'

Astromania
20 SP
Astronomers say magnetic field important for protecting a planet from the host star's 'winds'
Display of beautiful lights near poles indicative of Earth's magnetic field



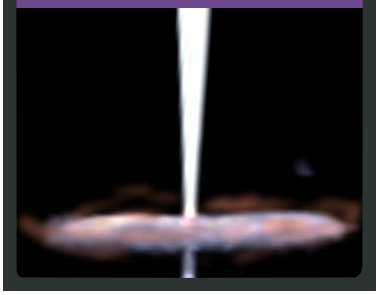
Astromania
20 SP
We expect every galaxy to have a dark matter halo around it
However, ongoing research finds some rare exceptions



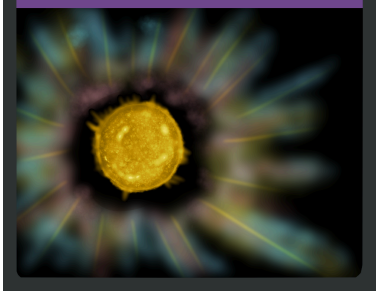
Astromania
20 SP
Many astronomical events emit neutrinos — the elusive 'ghost' particle that passes through everything
Neutrino detections may help us solve many mysteries of the universe

✂Cut along the dotted line

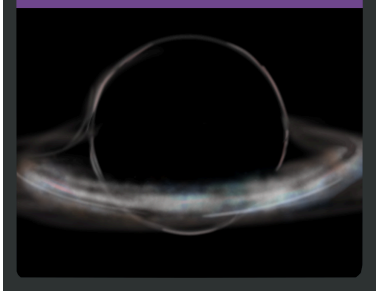
Astromania
20 SP
Many explosive events have jets coming out of them
We are yet to understand the complete physics of these jets



Astromania
20 SP
We thought we weren't counting neutrinos from the Sun correctly
Turns out, we simply had to account for how much neutrinos change their identity

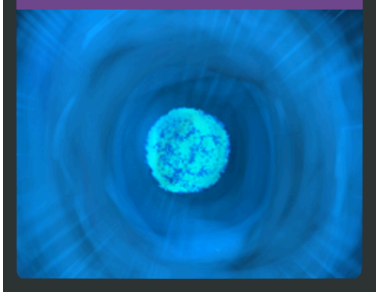


Astromania
20 SP
Astronomers spot black holes using the light that shines before it eats up stars
The Black Hole then proceeds to eat up the light

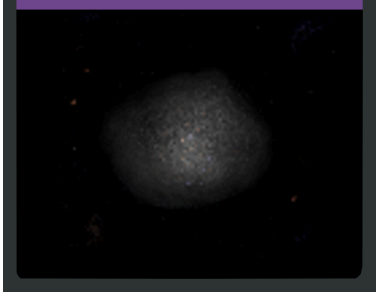


Astromania
20 SP
We can only see about 5% of the things in the universe
The rest is the invisible and elusive Dark Matter and Dark Energy

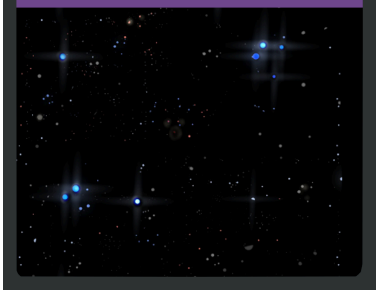
Astromania
20 SP
Stars chuck out gas in space — astronomers call them 'stellar winds'
Stellar winds of some stars remain an enigma



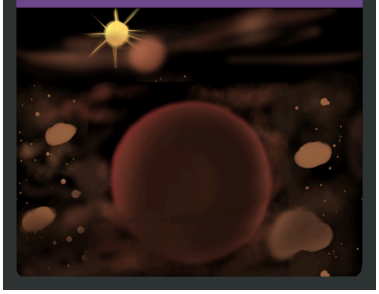
Astromania
20 SP
Scientists ponder the true nature of Dark Matter, come up with multiple possibilities
A comprehensive theory yet to be confirmed



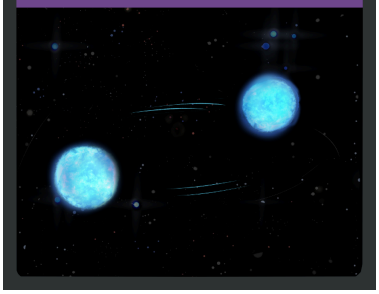
Astromania
20 SP
The universe will end in a 'Heat Death' but it won't be hot
Everything will simply stop moving



Astromania
20 SP
We keep finding planets outside the solar system
Research ongoing on whether any of them could host life



Astromania
20 SP
Most stars have companions
Sometimes more than one!



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