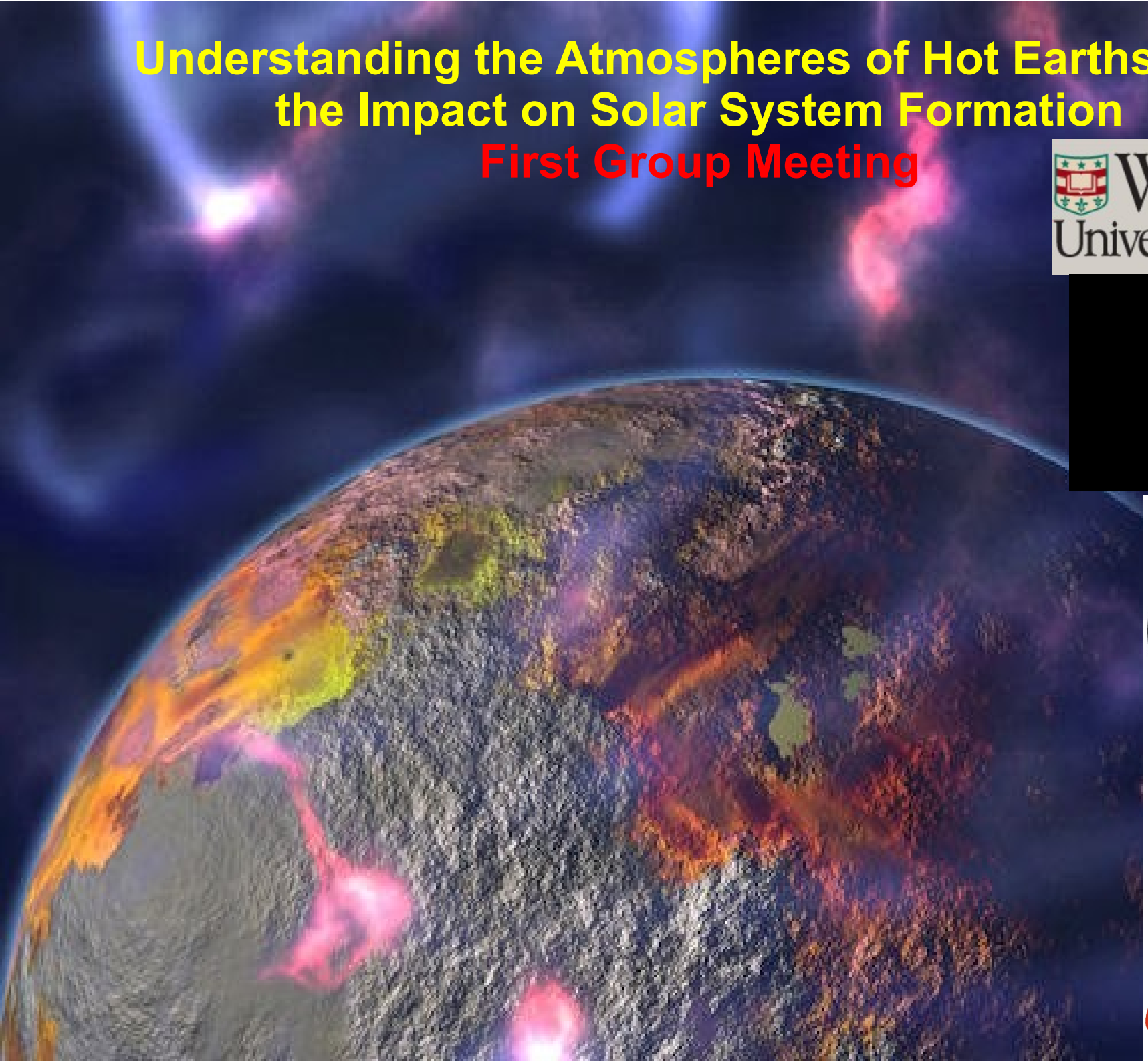
Understanding the Atmospheres of Hot Earths and the Impact on Solar System Formation

First Group Meeting



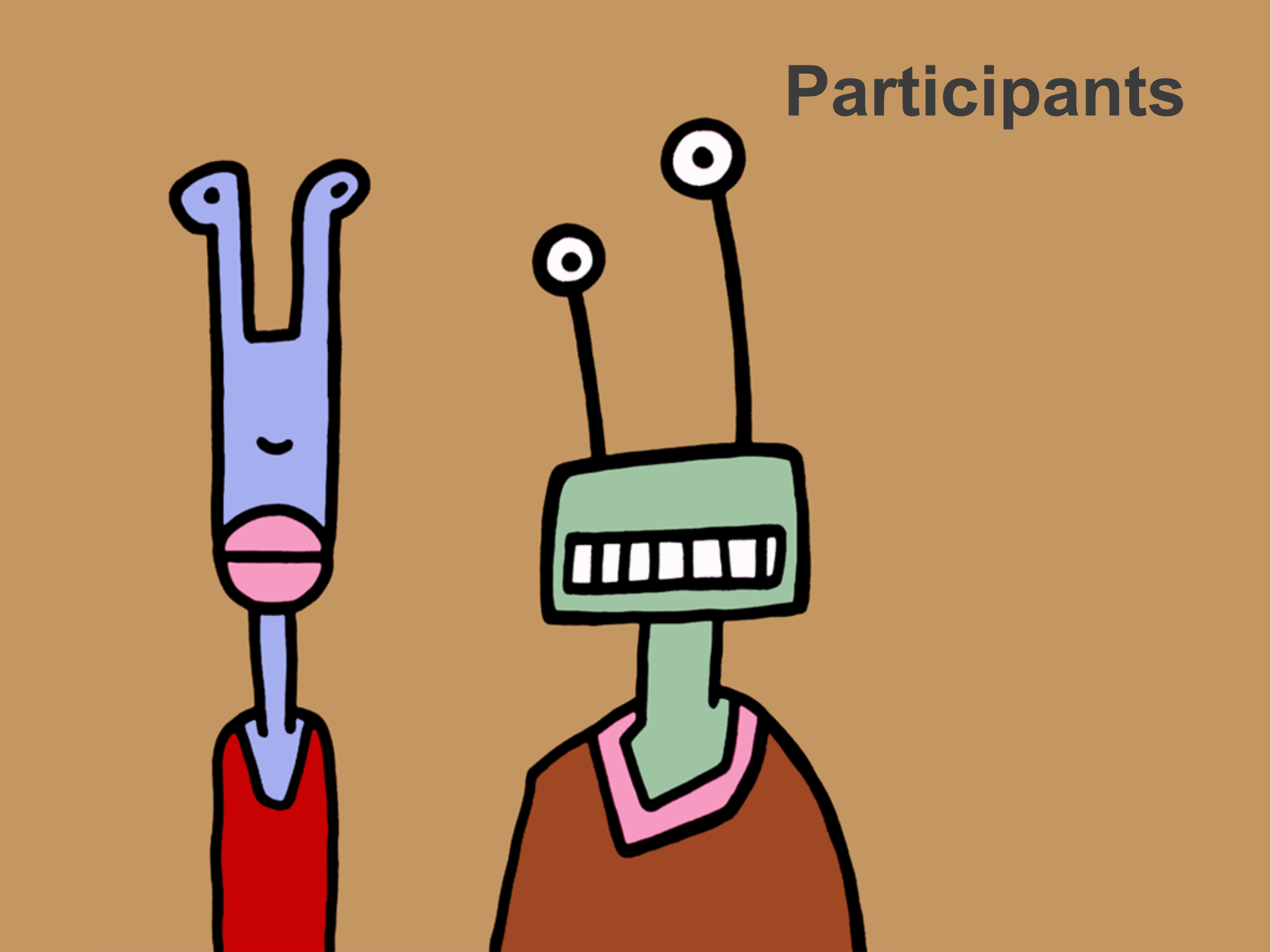
Washington University in St. Louis

NASA

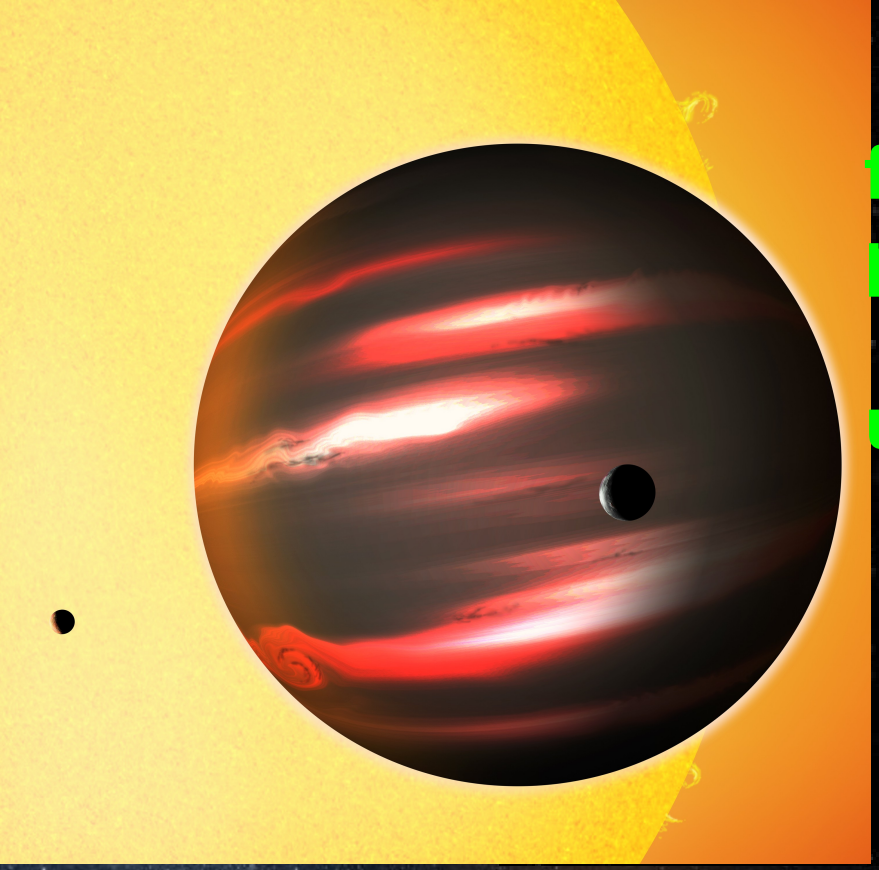
Department of Physics, Astronomy & Materials Science MSU

NASA EPSCoR

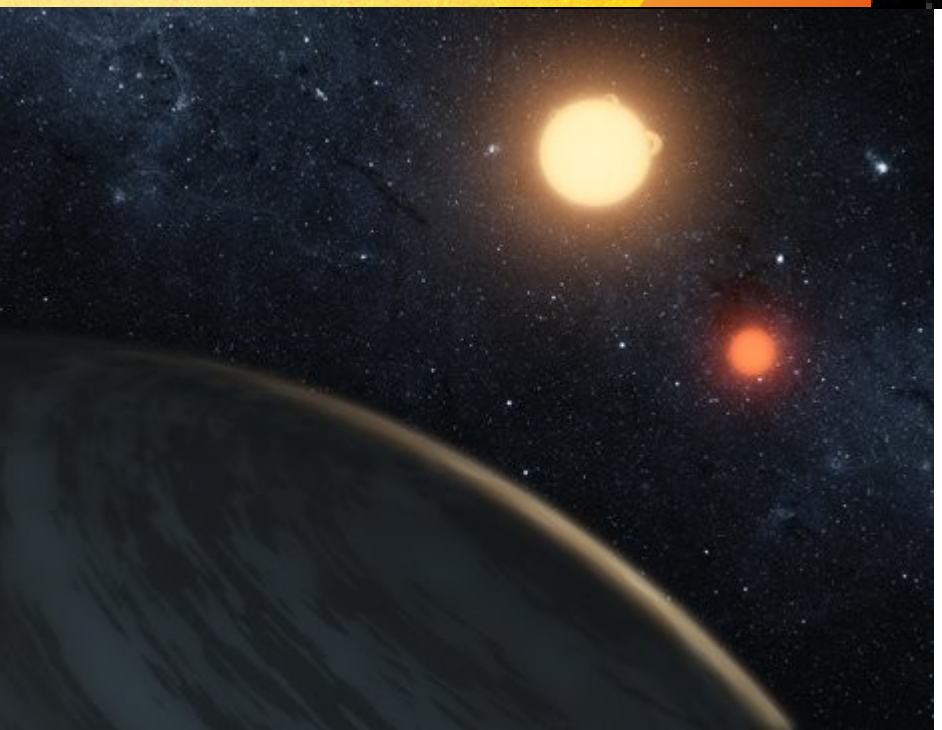
Participants




The origin of our work.
Characterization

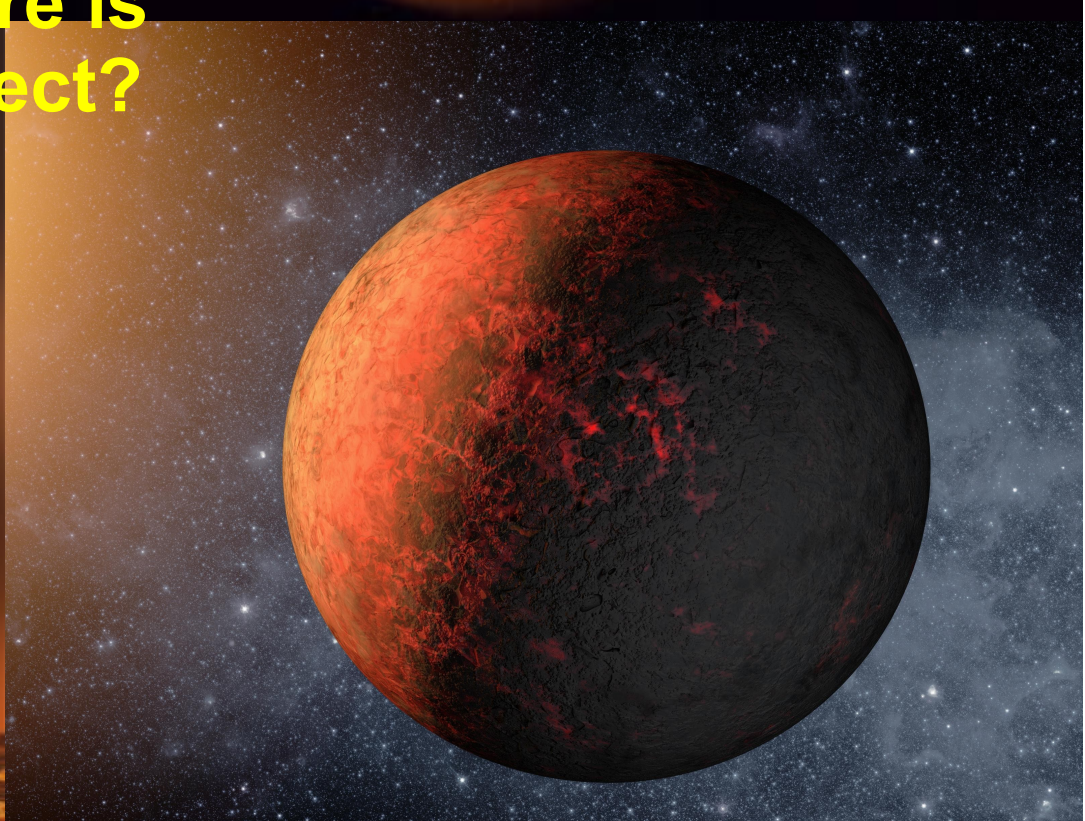


Kepler has found some pretty weird (and unexpected) stuff!



What would that look like?

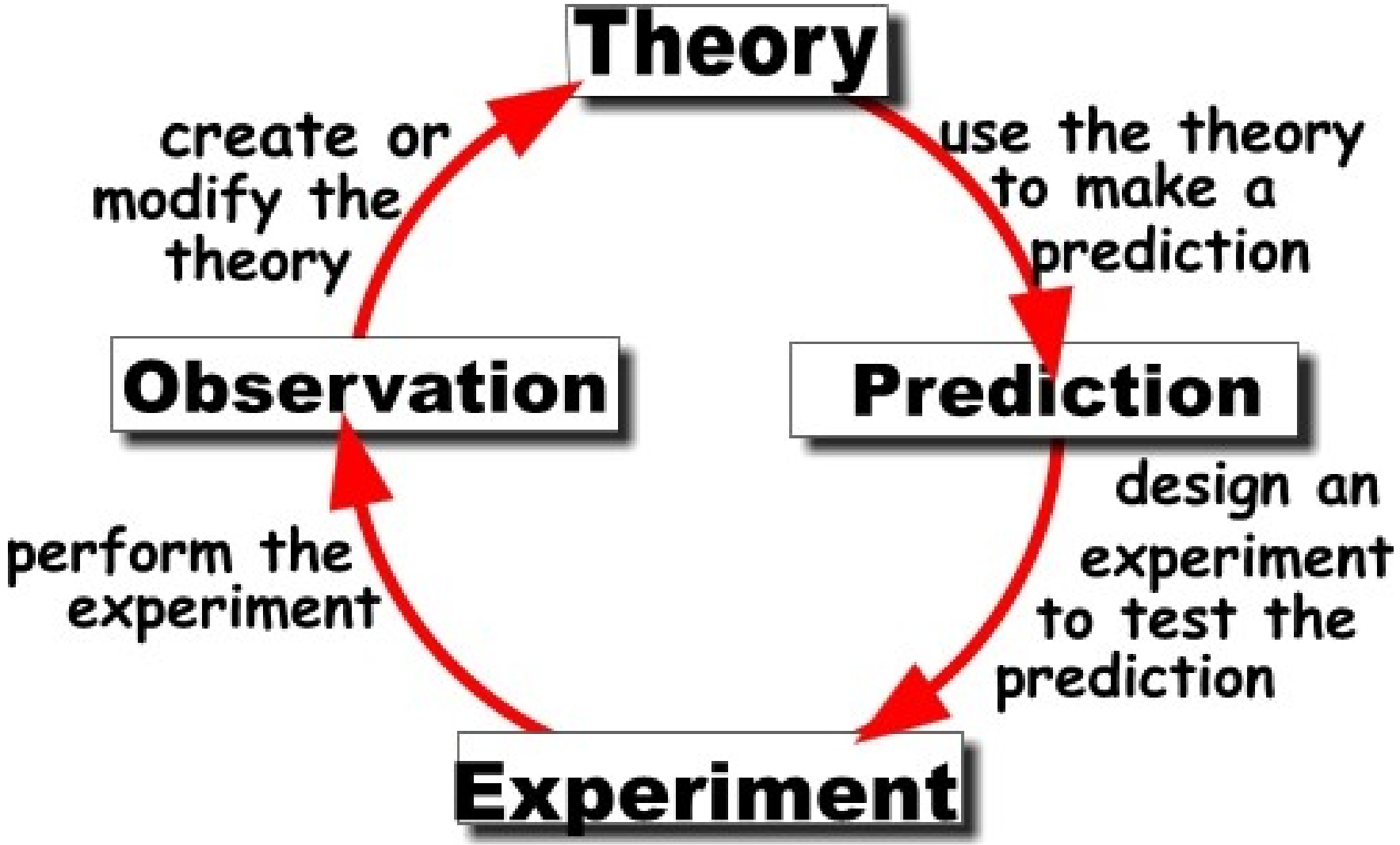
Which (if any) picture is correct?




Successful
Grant
Experiment
Mike
Theory
Observation

Thanks to efforts from all the PIs, we were awarded an EPSCoR grant totaling $890,730 (including match) for three years:
Jan. 15, 2013 - Jan 14, 2016

The goal is to get all the pieces working together to generate testable models (theory)




Then explore other, deeper questions, including those of uniqueness of our solar system.
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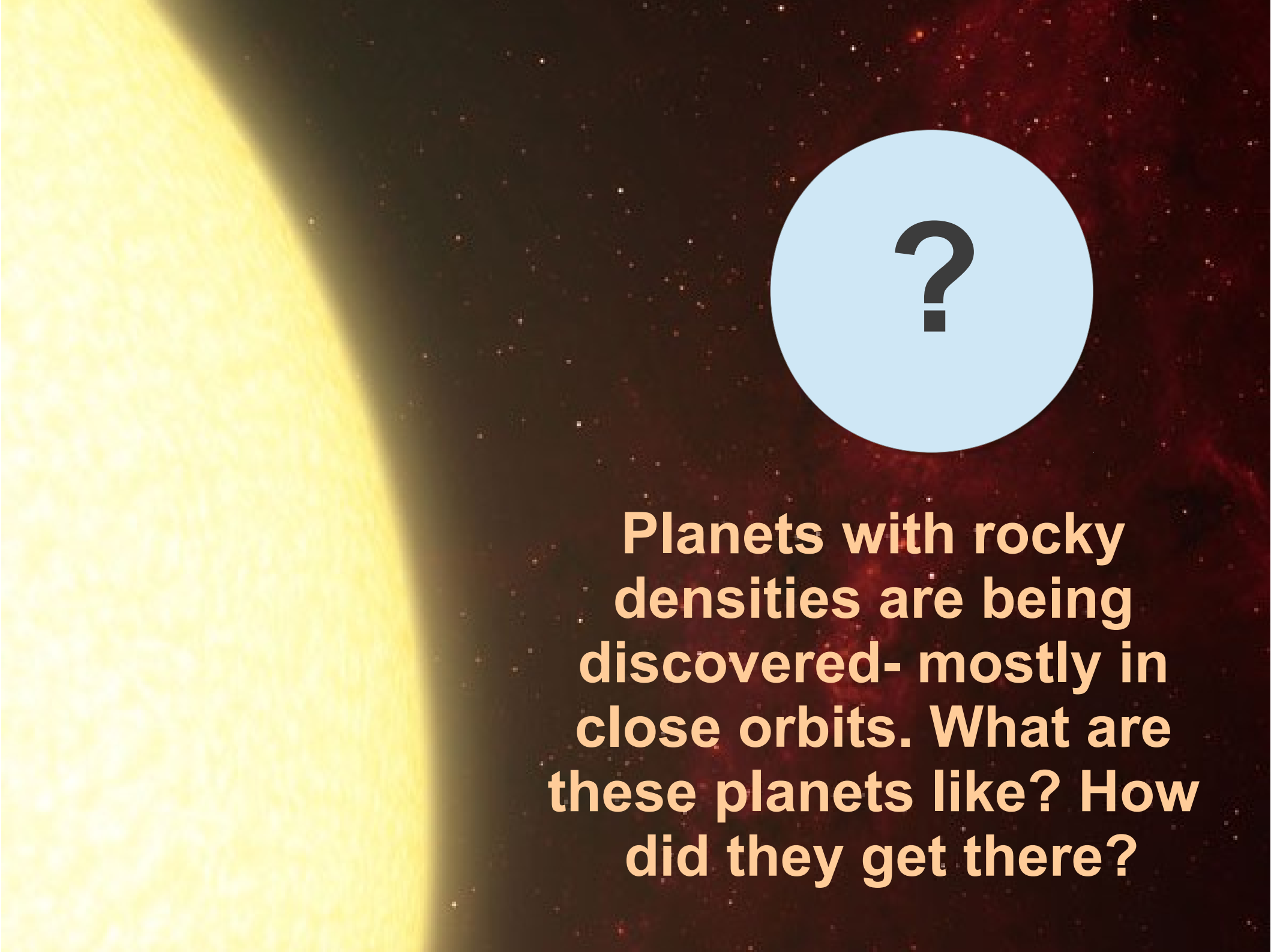
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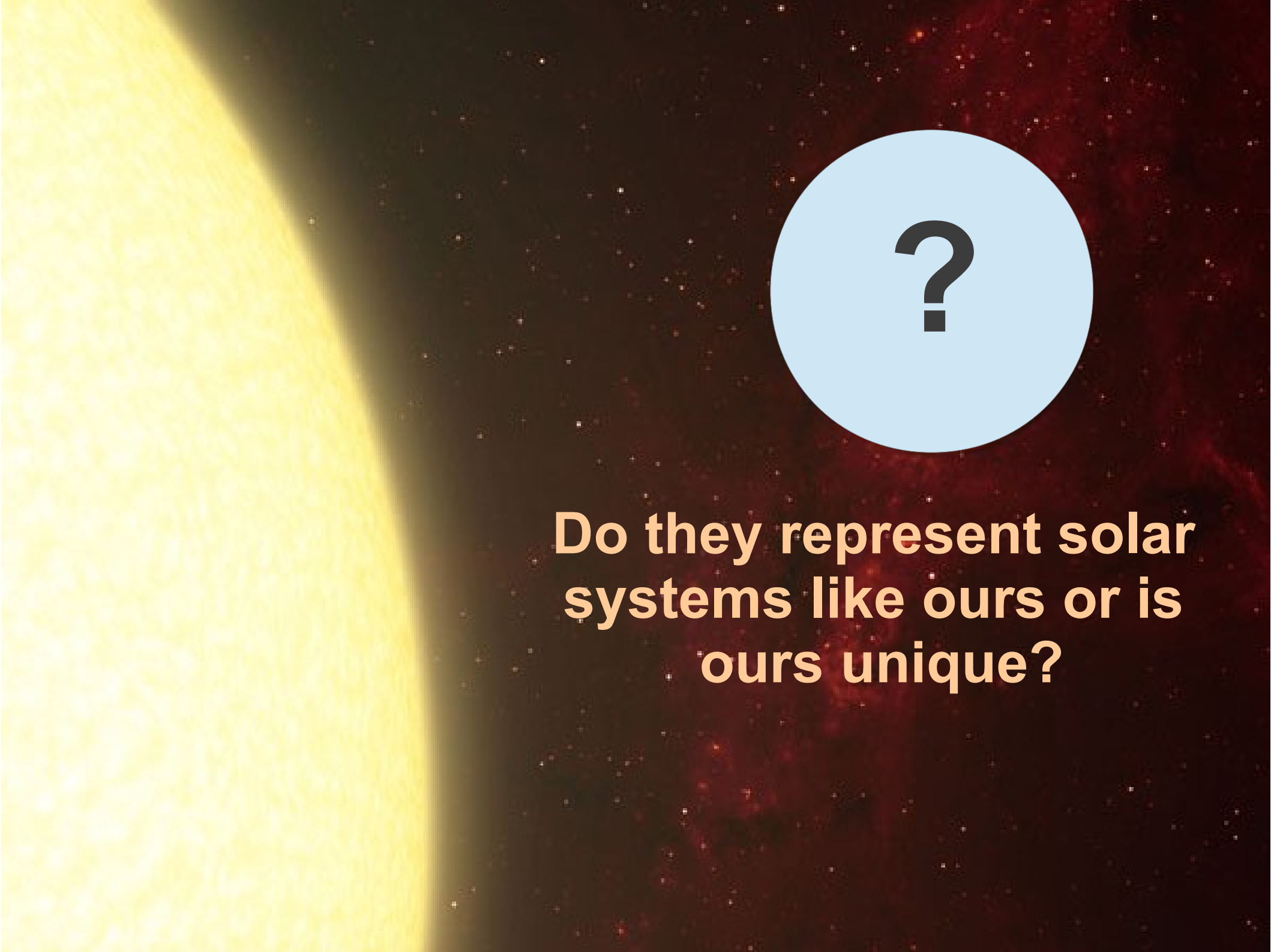
Planets with rocky densities are being discovered- mostly in close orbits. What are these planets like? How did they get there?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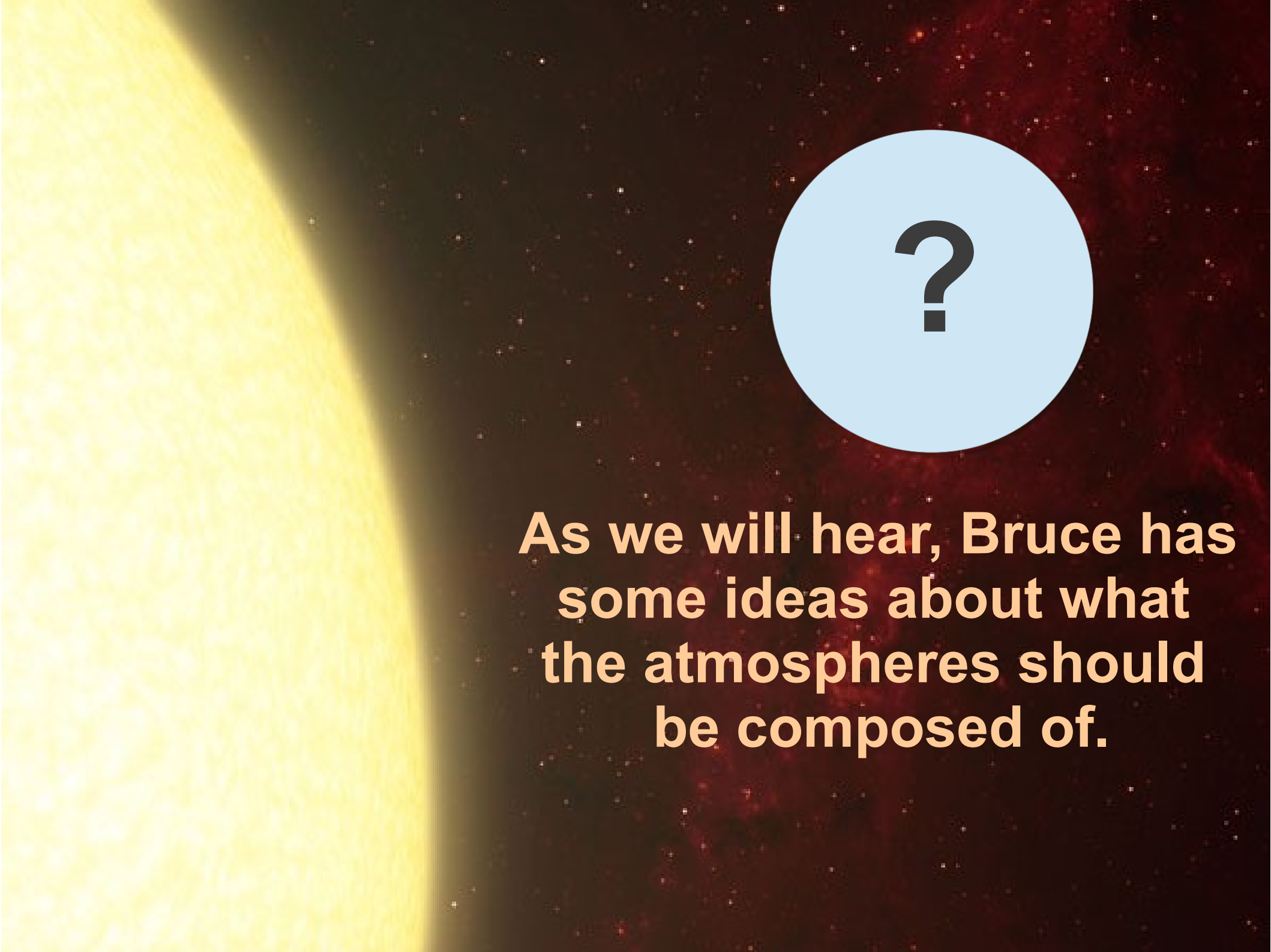
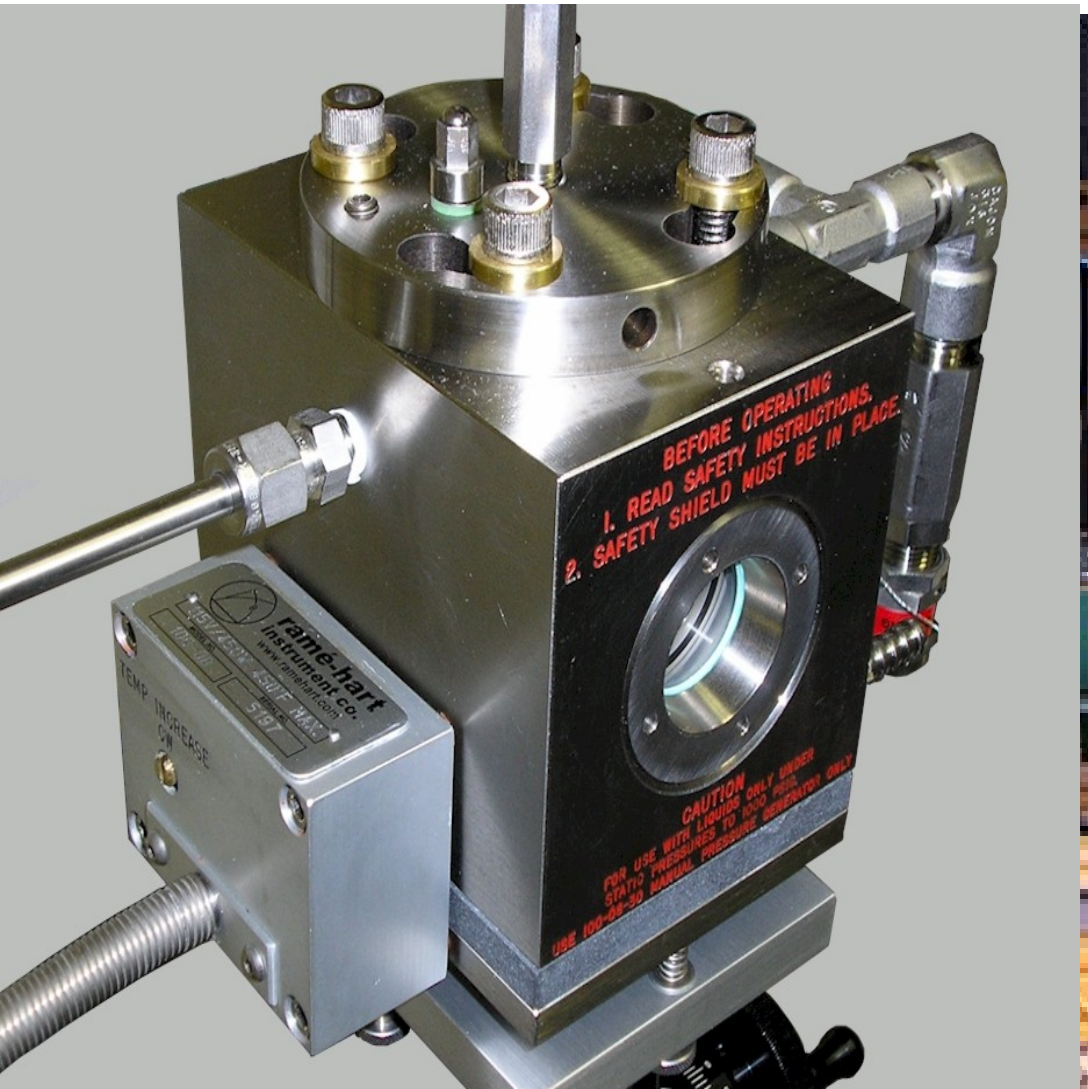
Do they represent solar systems like ours or is ours unique?

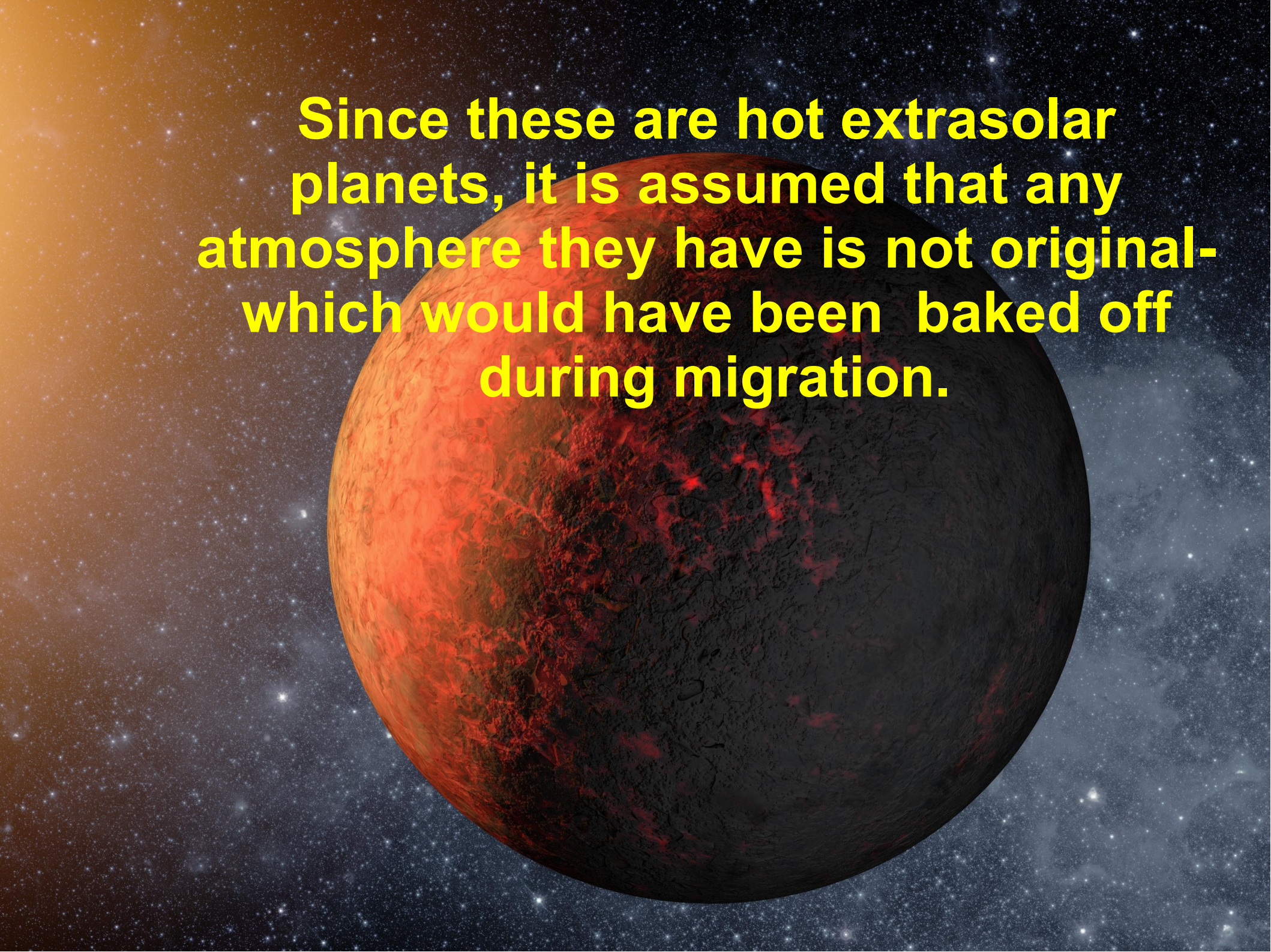

?
As we will hear, Bruce has some ideas about what the atmospheres should be composed of.

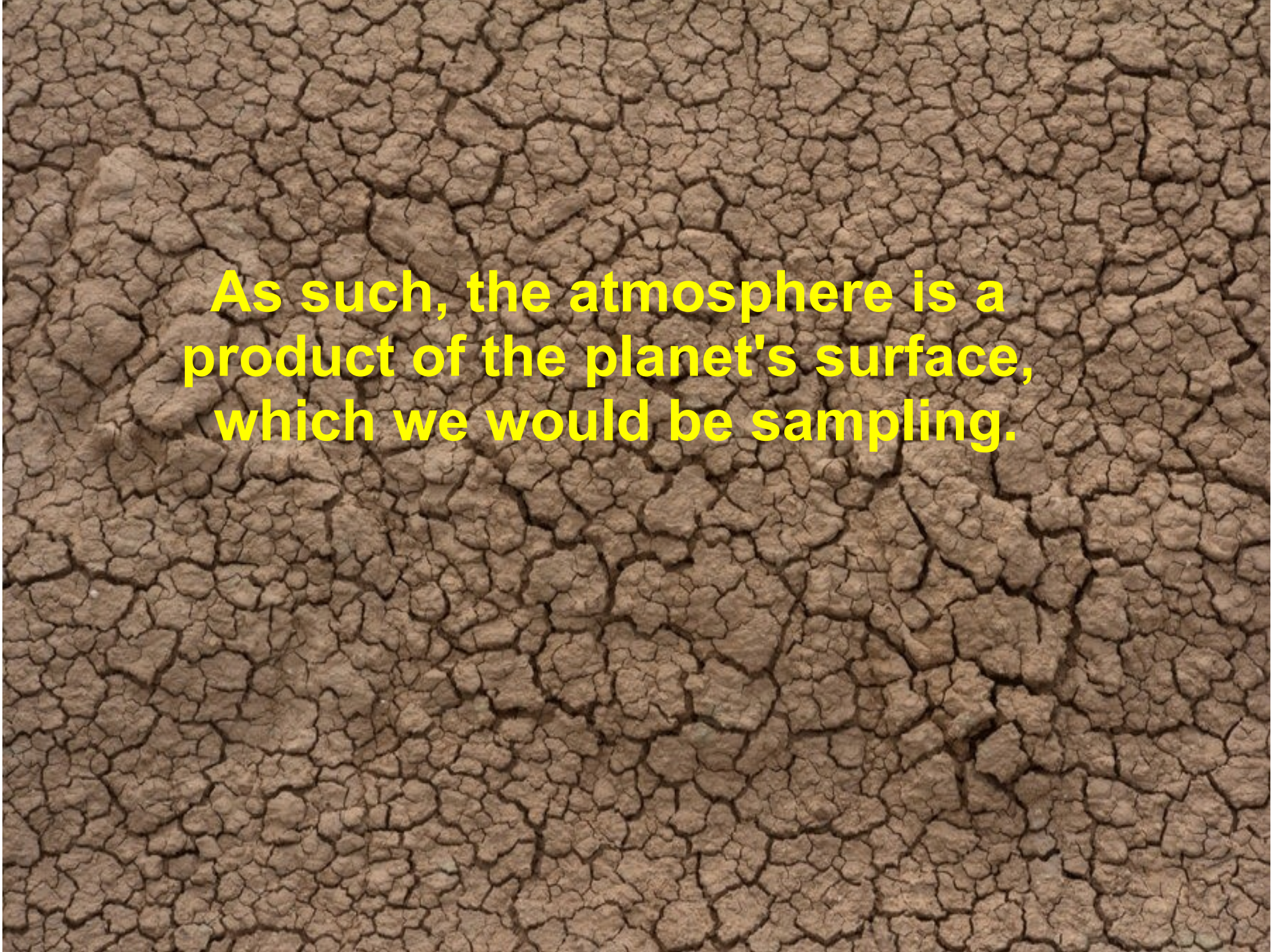
Then it's up to Dave, Nate, and crew to produce what Bruce predicts in the lab and measure the light absorption/emission properties under actual conditions.



My group will determine strategies for isolating the optical properties of the planets and then compare them to the lab measurements.

In so doing, we will directly test Bruce's theoretical atmospheres to determine the properties of the planets.


Since these are hot extrasolar planets, it is assumed that any atmosphere they have is not original- which would have been baked off during migration.


As such, the atmosphere is a
product of the planet's surface,
which we would be sampling.


Which itself is a product of the disk
in which it formed.
And that's our mission!
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By-products of our work:

- Increased complexities in atmospheric code
- A new high-temperature lab at MSU.
- Spectral predictions for future observations (JWST)
- Testing ground-based capabilities for characterizing extrasolar planets.
- Developing/testing image processing techniques to increase accuracy to necessary levels.
- more?