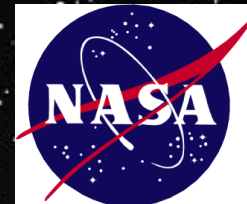


Astrobiology

Interdisciplinary Prospectus

Penelope J. Boston

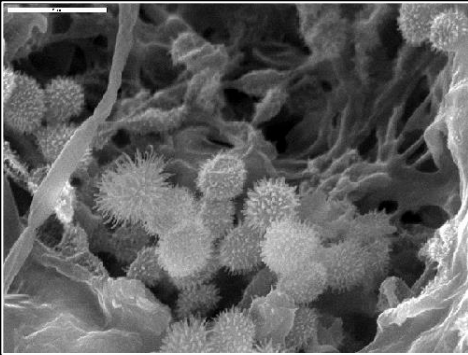
Director, NASA Astrobiology Institute
NASA Ames Research Center
Moffett Field, CA



Astrobiology

3 fundamental questions

How does life begin & evolve?



Does life exist elsewhere in the universe?



What is the future of life on Earth & beyond?



NASA Astrobiology Institute

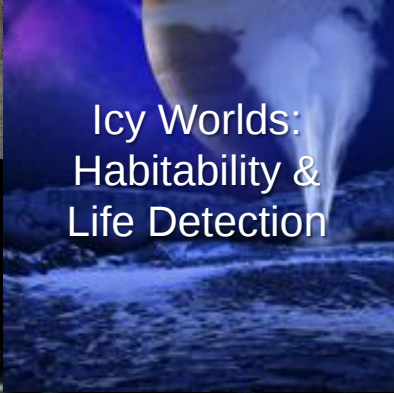
Areas of Active Engagement



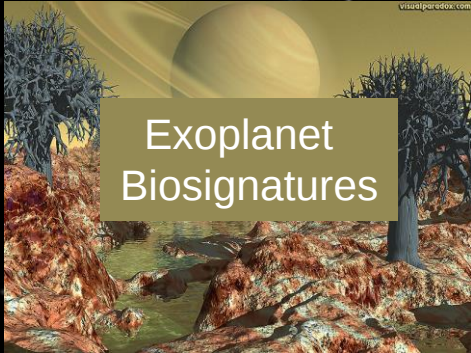
Origin & Nature of
Life, Co-evolution
with Planet Earth



Mars: NASA's Journey to Mars
Habitability
of Early Mars



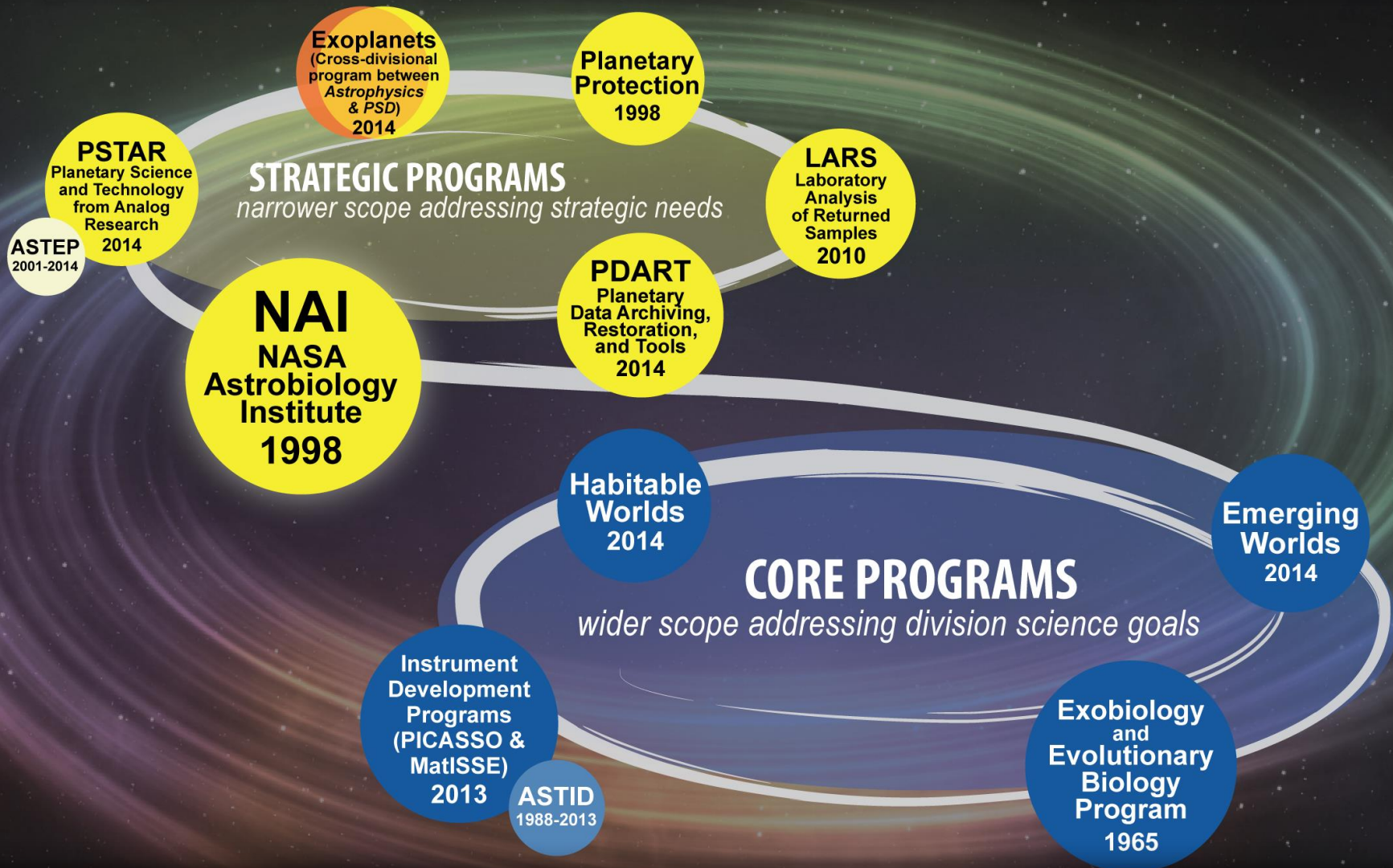
Icy Worlds:
Habitability &
Life Detection



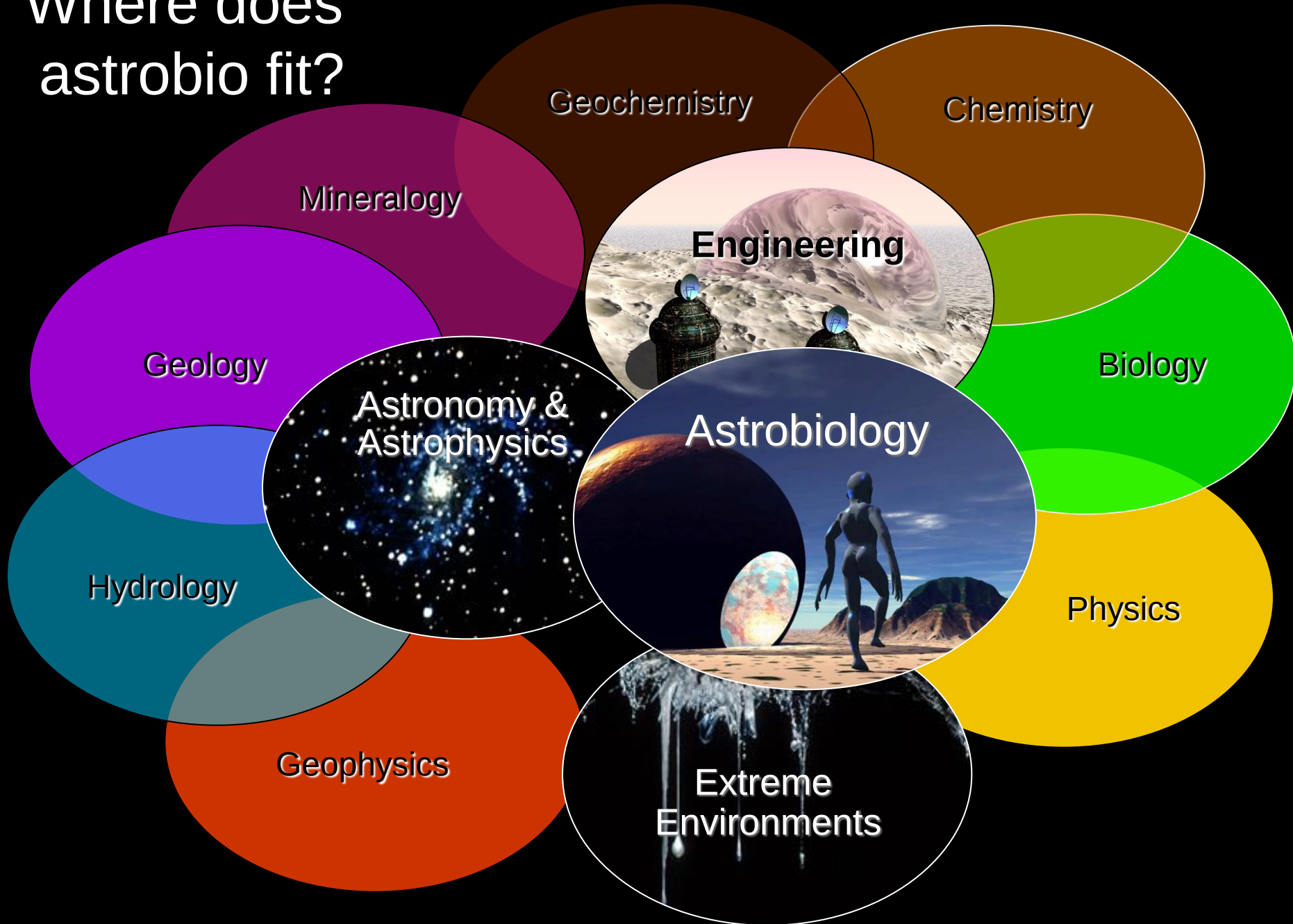
Exoplanet
Biosignatures

Astrobiology at NASA

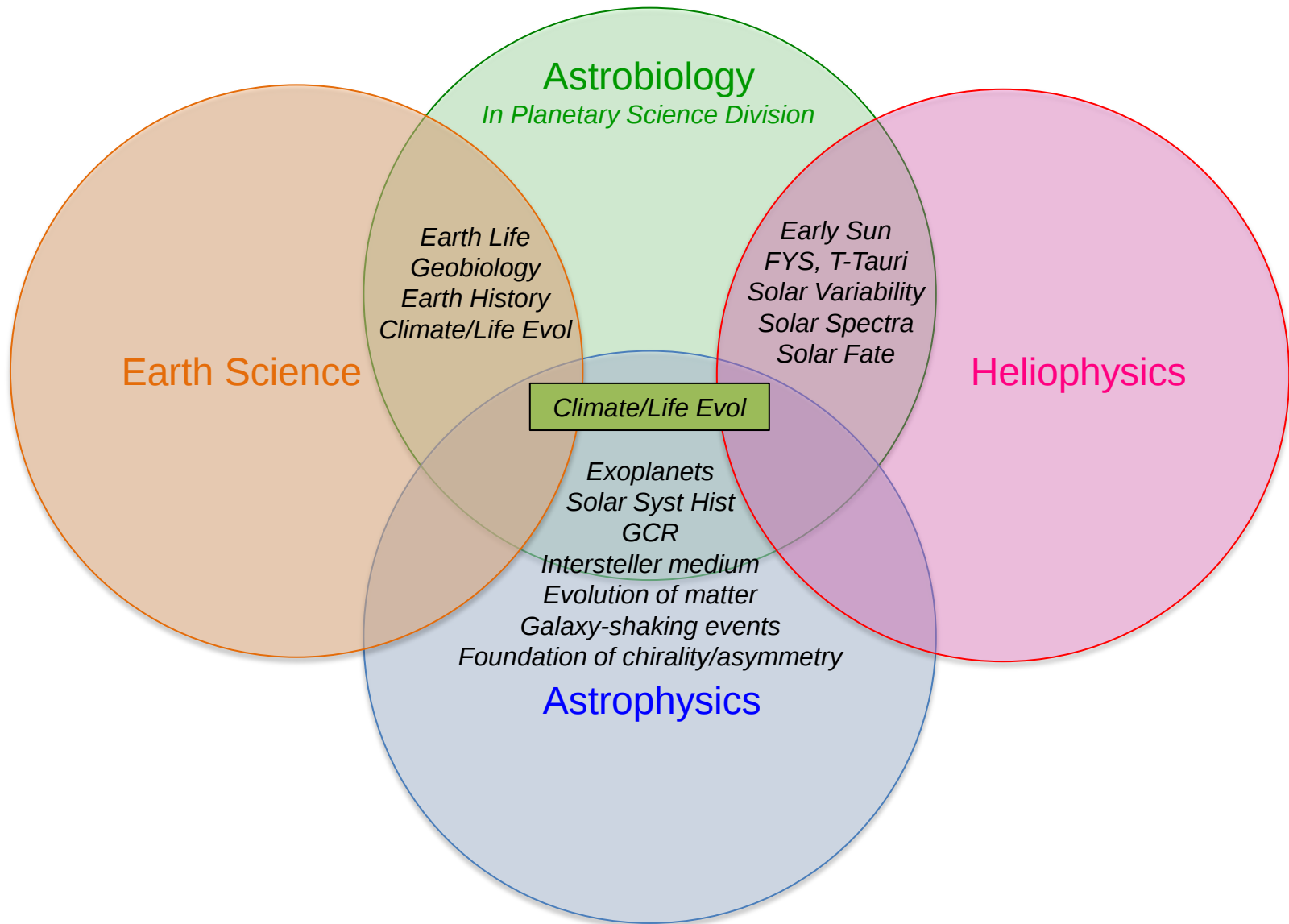
Planetary Science Division (PSD), Research & Analysis Program

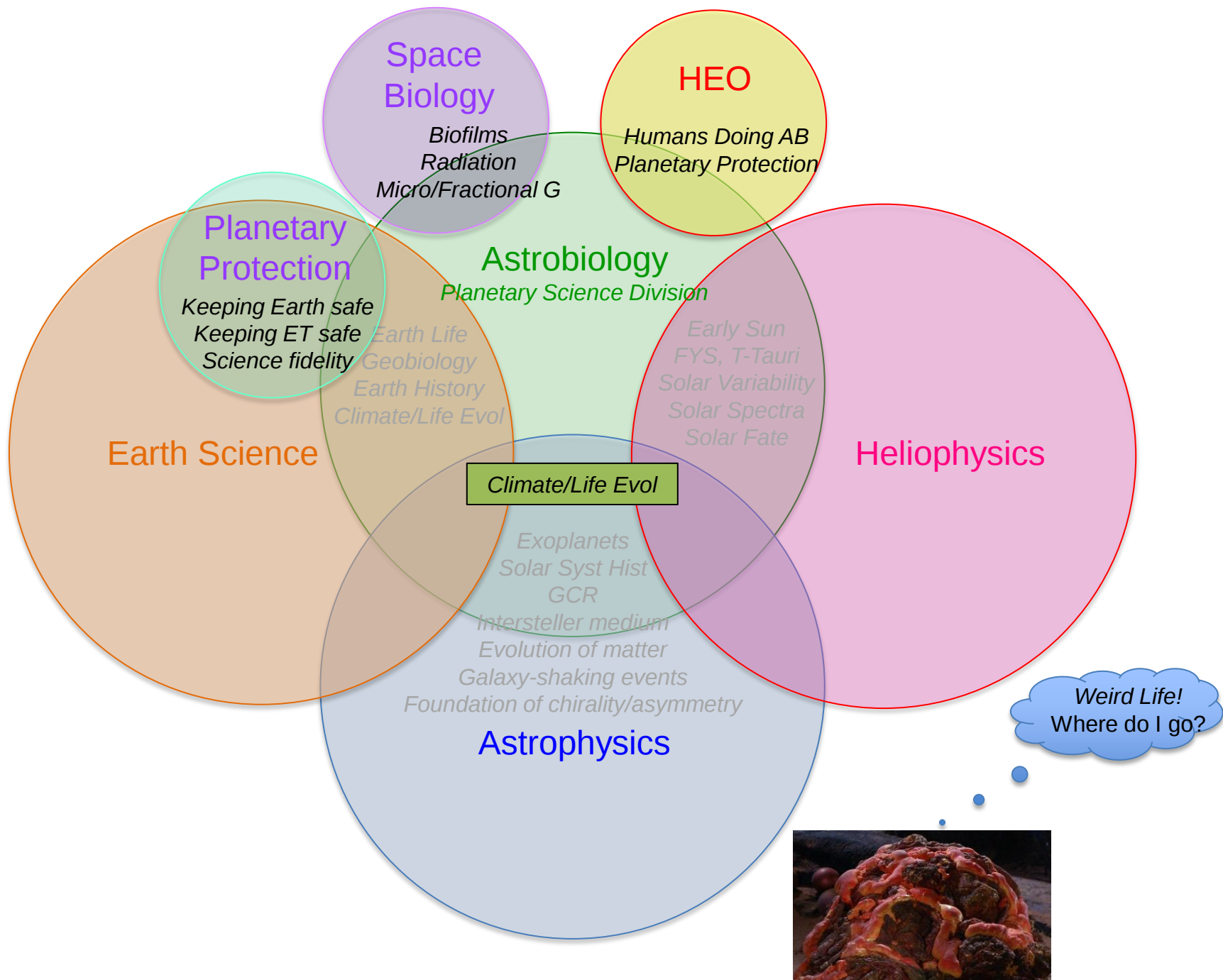


Where does astrobio fit?



Overlapping Interests with Other Science Mission Directorate Divisions





Concerns

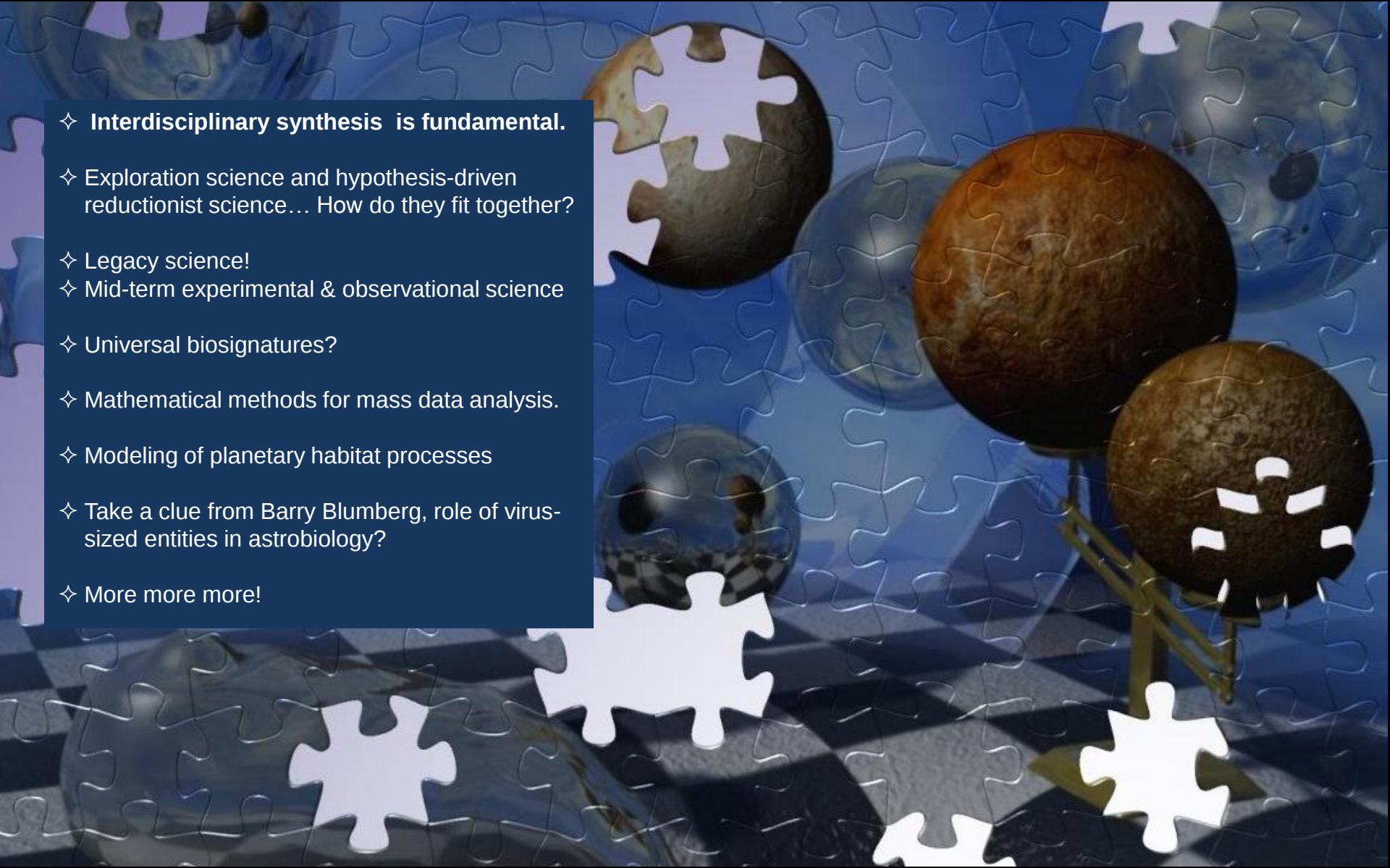
- Program “stove-piping” as an inhibition to cross-cutting work
 - *Missions*
 - *Ground-based research*
 - ***Cross-disciplinary proposals***
- Level of scientific approach – e.g. hypothesis-driven vs. discovery-driven
- Fundamental vs. situational science
- Mismatch of end-goals
- Metrics of performance, “proof”, what is valuable science
- Cross disciplinary “suspicion”

Antidotes

- Communication between communities!
- **Grassroots demand!**
- Becoming “multi-lingual”, i.e. terminology issues
- Proposing to astrobiology programs requires framing in astrobiology terms
- And ditto to other programs

Astrobiology Prime Challenges According to PJB

- ✧ **Interdisciplinary synthesis is fundamental.**
- ✧ Exploration science and hypothesis-driven reductionist science... How do they fit together?
- ✧ Legacy science!
- ✧ Mid-term experimental & observational science
- ✧ Universal biosignatures?
- ✧ Mathematical methods for mass data analysis.
- ✧ Modeling of planetary habitat processes
- ✧ Take a clue from Barry Blumberg, role of virus-sized entities in astrobiology?
- ✧ More more more!



The Future of NAI According to PJB

- ✧ Honoring NAI's history while seeking to improve and advance our science & impact on missions.
- ✧ Where is the NAI working?
- ✧ Where should tweaking occur?
- ✧ Is connectivity working as planned?
- ✧ How can we become more inclusive in an era of flat budgets???
- ✧ Co-evolution of science and enabling technology, grassroots up or top down?
- ✧ New technologies drive science, enhance interactions with STMD? national labs (e.g. Brookhaven?, etc.
- ✧ Planetary Protection folded in at a high level.
- ✧ Reaching "across the aisle" to Astrophysics-Astronomy on the issue of exoplanets
- ✧ Open to other ideas from the community!

Sprinkling of stardust,
Planet cauldron, add water...
Voila! Here comes Life!

