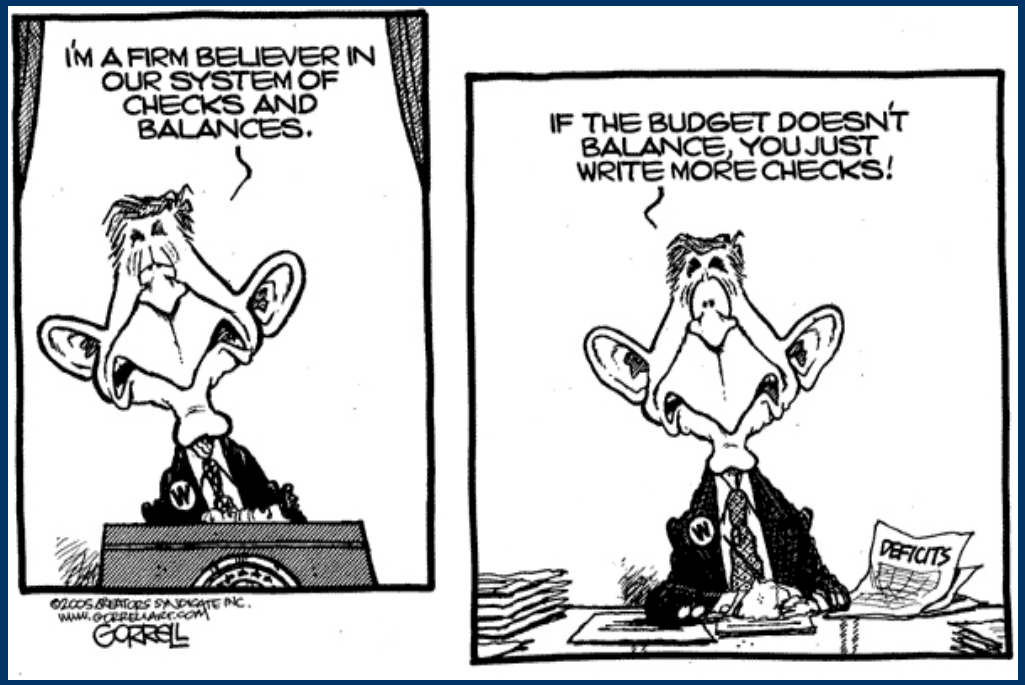
Top 5 Priorities for New, Not-Yet-Approved Astronomical Facilities

Paul Ries

IMPORTANT ASSUMPTIONS

- The following missions/projects scheduled to come online in the 2010-2015 time frame will continue receive appropriate funding
  - ALMA (2012)
  - SIM (2015)
  - GAIA (2012)



The List!

1) Hubble Replacement (JWST?)
2) OWL or Other Bigger and Better (tm) ground based optical/near-IR telescope
3) DUNE or other Cosmological Parameter Determination System
4) MAXIM – X-ray interferometers
5) Radio on the far side of the moon

5. Lunar Far Side Radio Mission [1]

What?

- Set up a bunch of crossed dipole antennas on the far side of the moon
- Observe at radio frequencies of <30MHz
- Size and location TBD

5. Lunar Far Side Radio Mission

Why?

- Low Radio noise
- No atmosphere
- Potential to observe previously unknown part of spectrum
- “Politically Correct”

5. Lunar Far Side Radio Mission

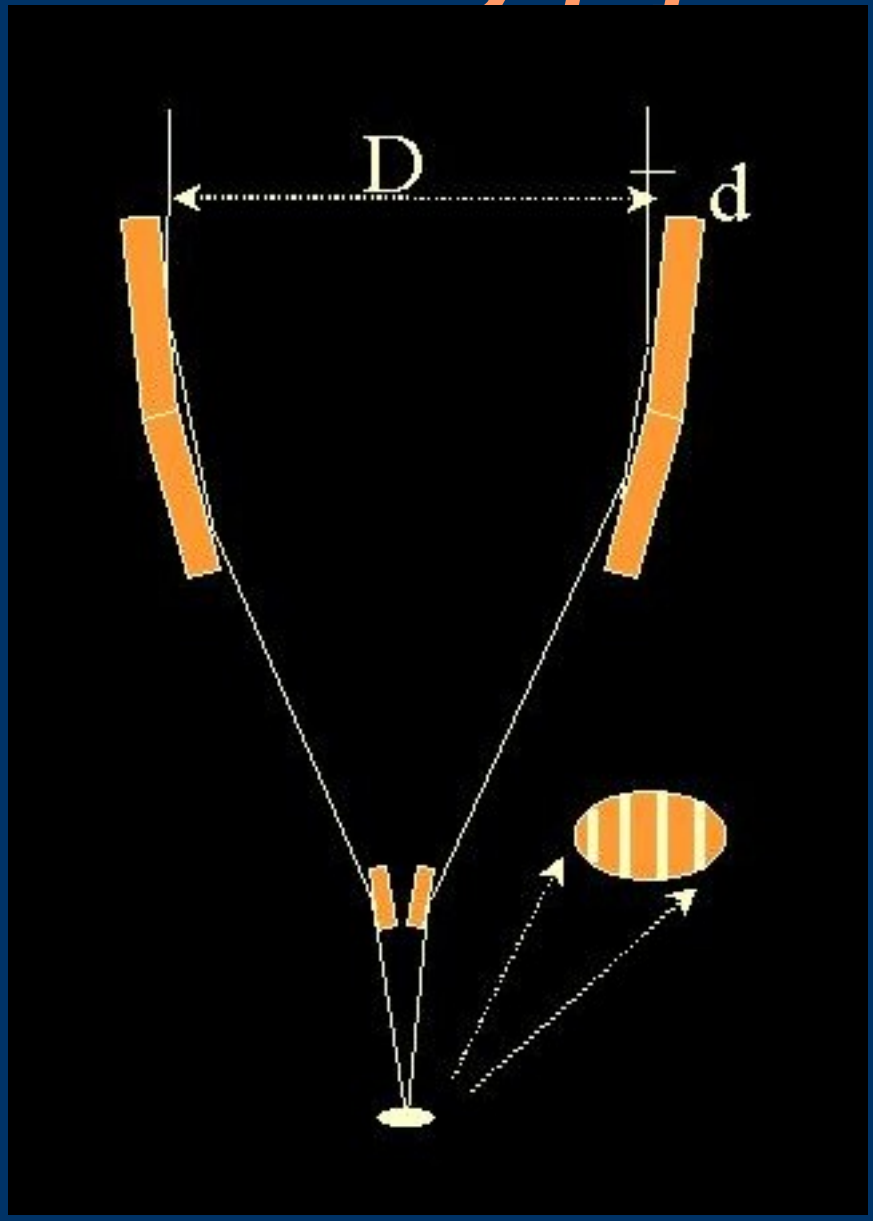
Why Not?

- Cost of 0.5-3 G$
- Requires Human presence on moon for set up

4. MAXIM/X-ray interferometry [2]

What?

- A long focal length, spaced-based x-ray interferometer
- Multiple spacecraft



4. MAXIM/X-ray interferometry

Why?

- Truly ground-breaking!
  - Chanra = 0.5 arcsec
  - MAXIM = 0.000001 arcsec
- Black-holes! Coronae of other stars!

4. MAXIM/X-ray interferometry

Why Not?

- Cost
- Technological Hurdles
  - Satellite formation flying
  - Fuel=problem

3. DUNE/Cosmology Missions [3,4]

What?

- A space based weak lensing and Type 1a Supernova Survey
- Designed to measure Dark Energy and Dark matter at low redshift
- Or any other new cosmology mission

3. DUNE/Cosmology Missions [3,4]

Why?

- Cosmology is one of the hottest research areas in astronomy
- Determines cosmological parameters independently of CMB
- Cosmology research does not end after Planck mission

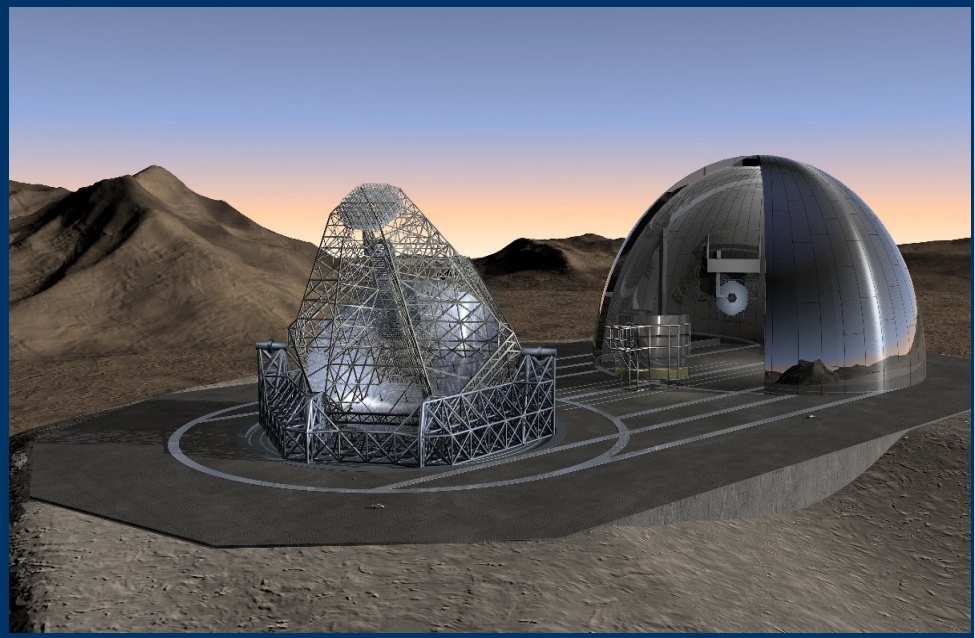
Why not?

- N/a

2. OWL or Other Bigger and Better Optical Telescope [5]

What?

- Enormous new ground based telescope (up to 100m diameter has been suggested)
- 3000+ mirror segments
- Observe in optical and near-IR



2. OWL or Other Bigger and Better Optical Telescope

Why?

- Ridiculous light-gathering capability
- Ridiculous resolving power (diffraction limit=0.001 arcsec)
- Imaging capable

Why not?

- Money
- Finding a location

1. Hubble Replacement (JWST)

Why is this an issue at all?

- Mission has yet to complete major review and move into detailed design phase (2007-2008)
- NASA priorities in flux (Hubble, ISS, JWST)
- JWST will need a successor

1. Hubble Replacement (JWST)

Why is this the #1 choice?

- Pretty pictures, pretty pictures, pretty pictures
- Hubble still doing science

References

1. Takahashi, Yuki. New Astronomy From the Moon: A Lunar Based Very Low Frequency Radio Array http://www.astro.gla.ac.uk/users/yuki/thesis/YukiThesis.pdf
2. Micro-Arcsecond X-ray Imaging Mission http://maxim.gsfc.nasa.gov/
3. DUNE: Dark Universe Explorer http://serweb.oamp.fr/perso/tresse/moriond06/talks/amara_moriond06.pdf
4. DUNE: Dark Universe Explorer http://adsabs.harvard.edu/abs/2006astro.ph.10062R
5. The ESO 100-m optical telescope concept http://www.eso.org/projects/owl/

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