Lasery pro vesmír

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Multidisciplinární analýza obrany planety před asteroidy jako klíčové národní politiky zajišťující mírový rozvoj a prosperitu lidstva na Zemi i ve vesmíru

Policy analýza pro podporu zlomových technologických projektů výzkumu vesmíru (TACR TL01000181)

Laser SpaceApps Workshop, September 2019

- IPS FSV UK, ÚMV, HiLase, Breakthrough Inititives, ÚFP
- Tři oblasti využití laserů (meziplanetární cestování, odklon a analýza asteroidů, kosmické smetí)
- Technické překážky
- Politické překážky
- Prezentace českých kapacit

Mothership deploys sail ~1/week

200 GW Ground Based Laser propels lightsail for 8 minutes

Sail is (mostly) a projectile for 22 years

Data Return ~4 light years

Launch in mid century
Velocity: 0.2c
1 gram payload
Target: Alpha Centauri System

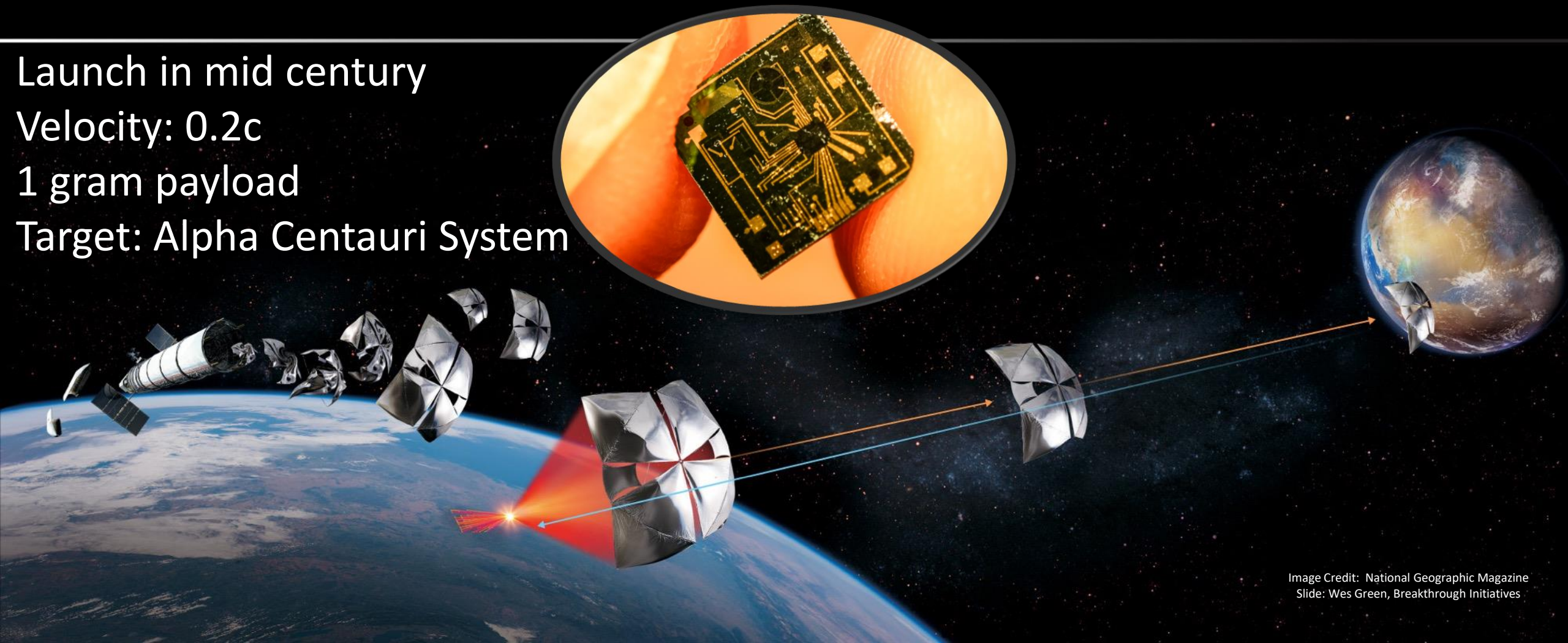
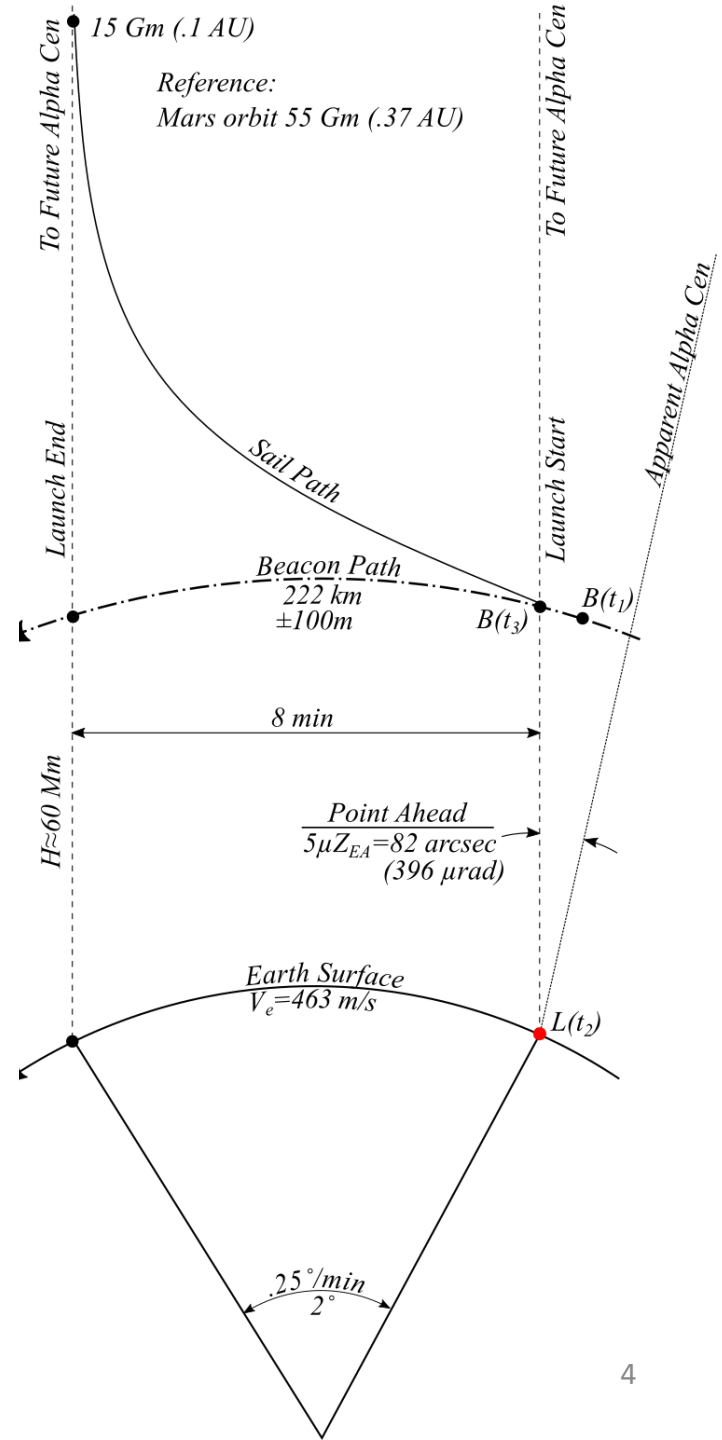


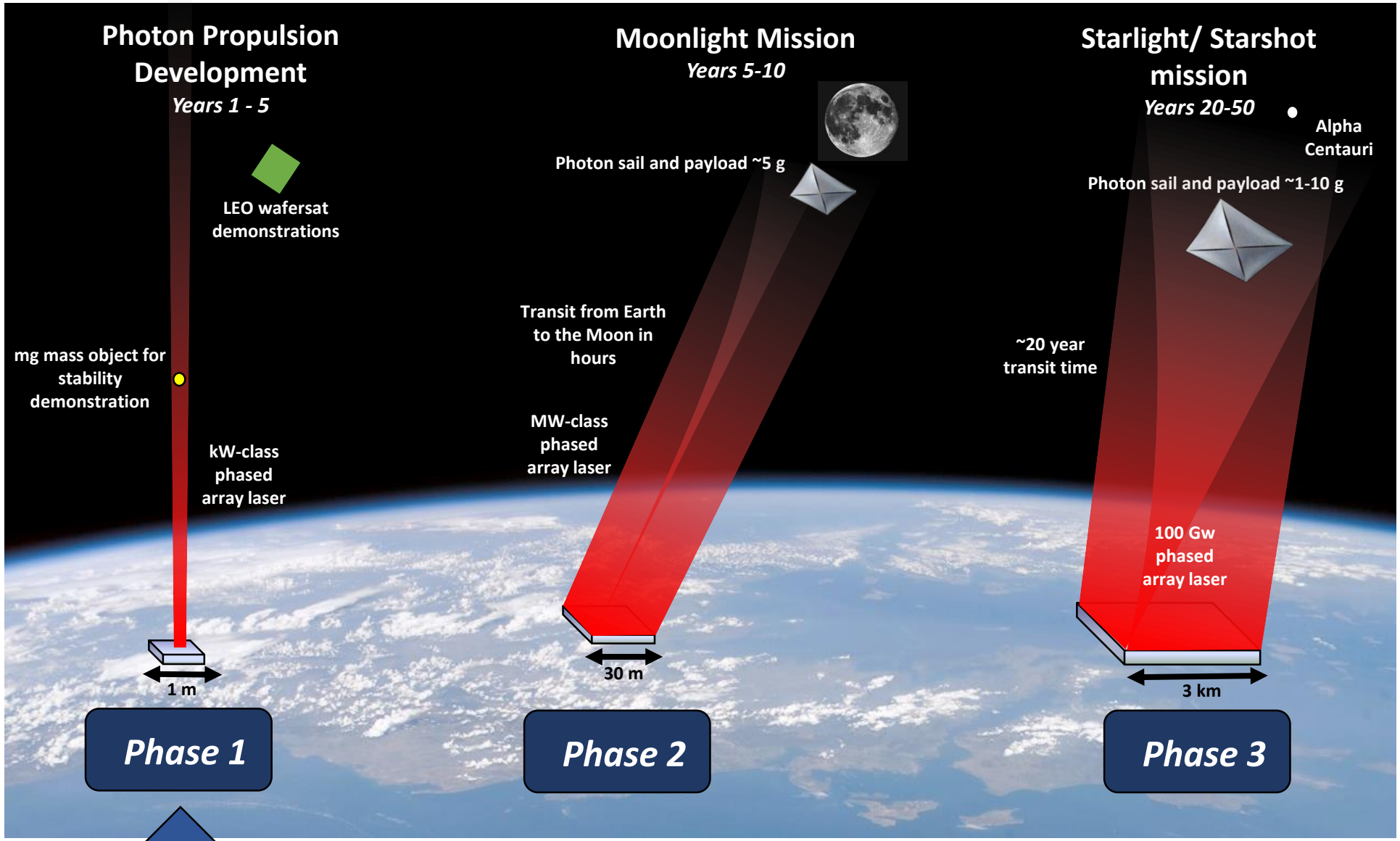
Image Credit: National Geographic Magazine
Slide: Wes Green, Breakthrough Initiatives

Table 1
System model inputs for 0.2 c mission.

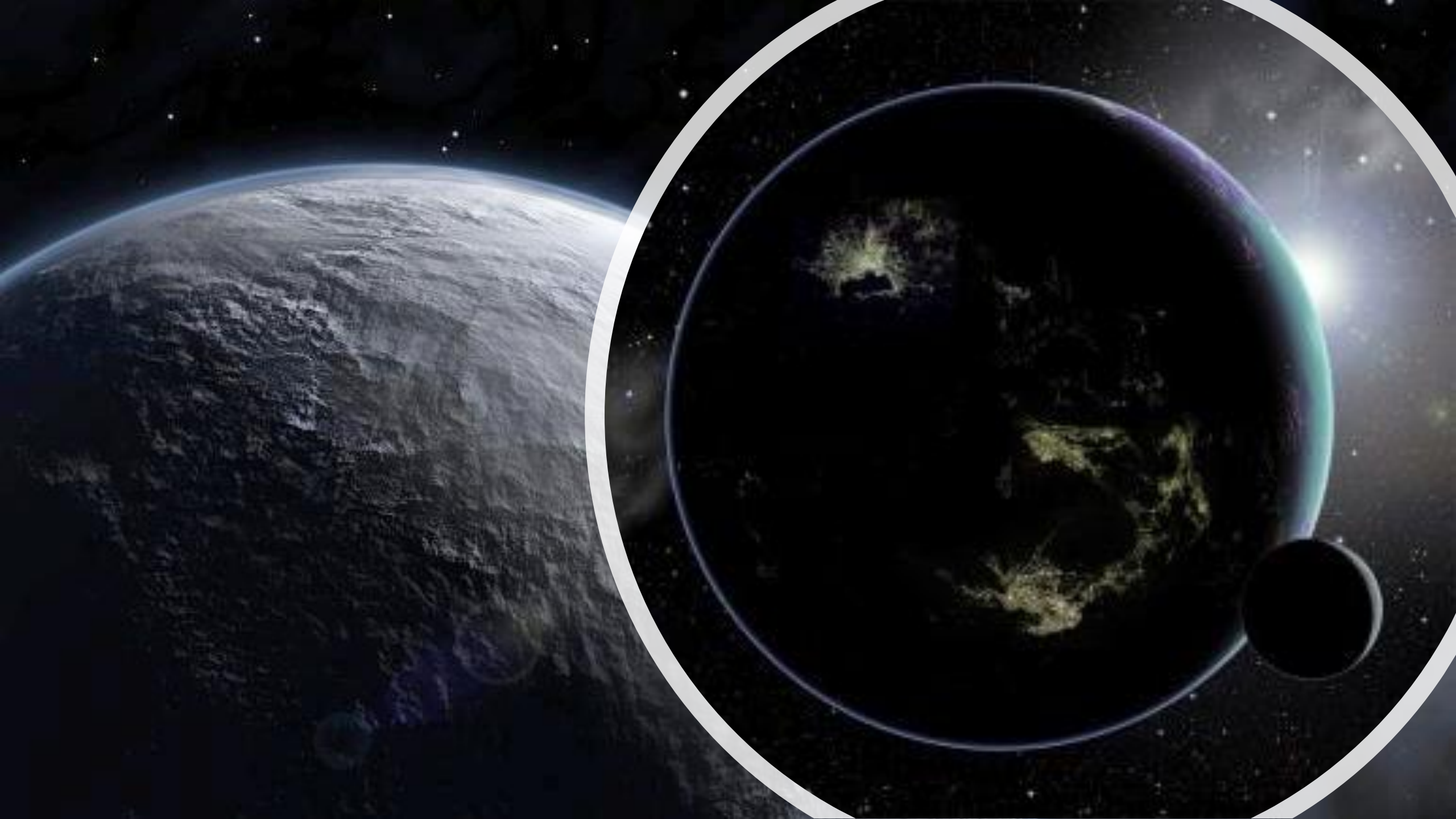
0.2 c target speed
1.06 μm wavelength
60000 km initial sail displacement from laser source
1 g payload
0.2 g m^{-2} areal density
10^{-8} spectral normal absorptance at 1.06 μm
70% spectral normal reflectance at 1.06 μm
625 k maximum temperature
0.01 total hemispherical emittance (2-sided, 625 k)
$0.01/W laser cost
$500/$m^2$ optics cost
$50/kWh storage cost
50% wallplug to laser efficiency
70% of beam power emerging from top of atmosphere



A Path to the Stars, In Our Lifetime



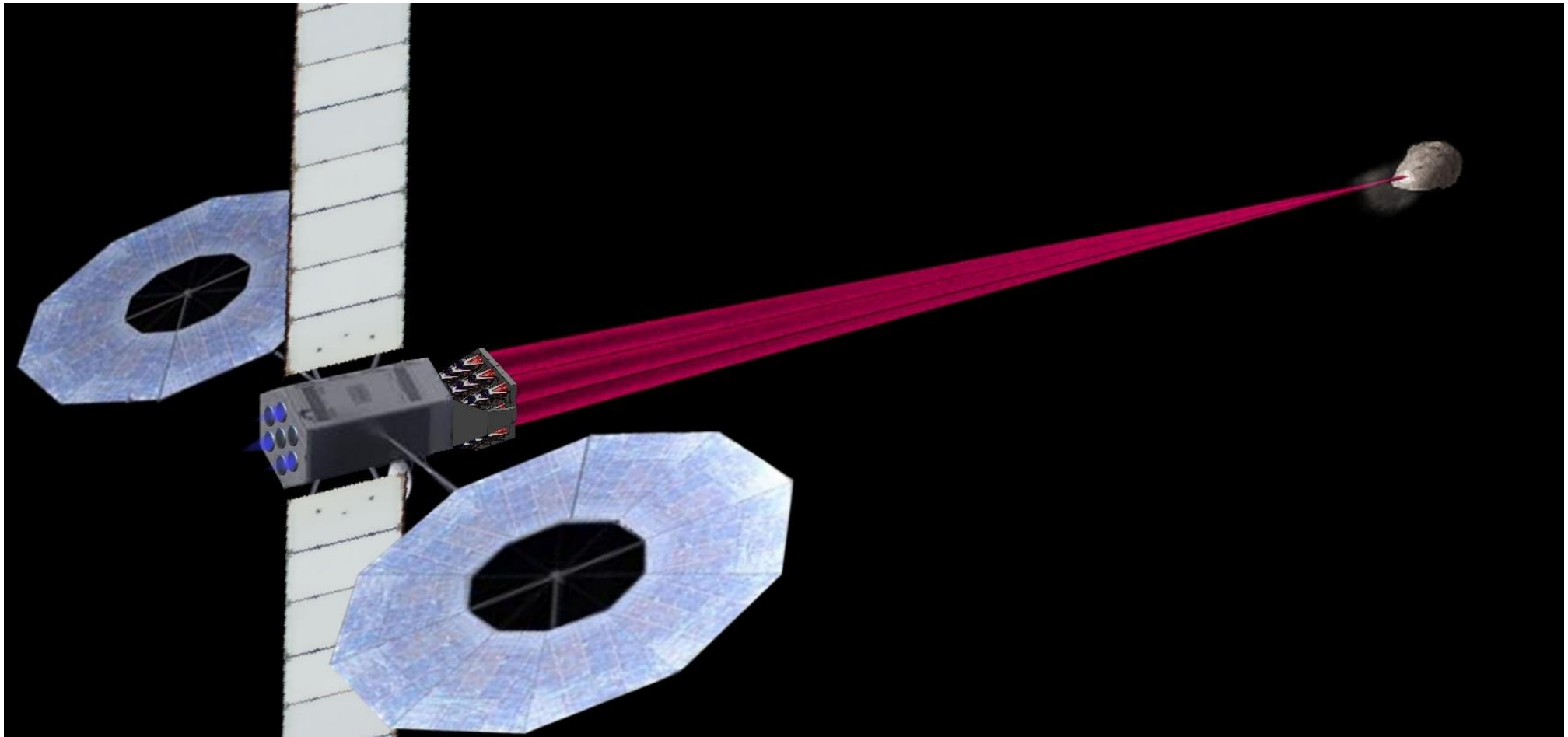
We are here.



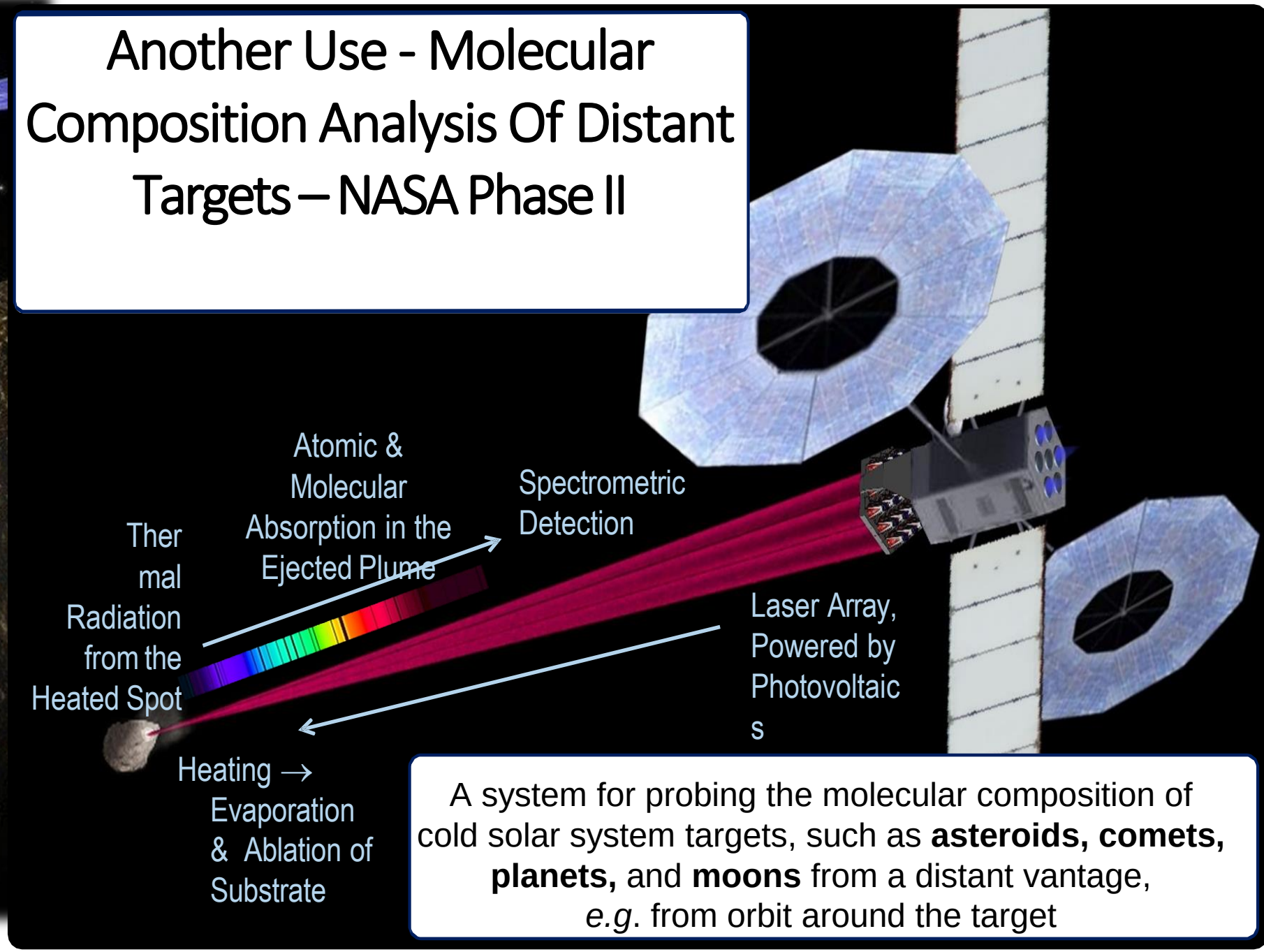
Odklon asteroidů (Phil Lubin, UCSB)

Space-based, 10-1000KW, 1-100 N force, ablation as the deflecting force

Stand off, GW Class, 30-50yrs in future, multipurpose (Starshot), photons for deflection



Another Use - Molecular Composition Analysis Of Distant Targets – NASA Phase II

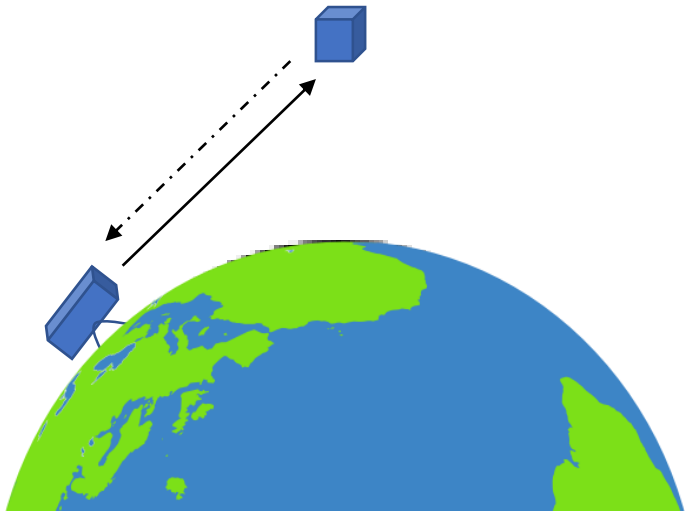


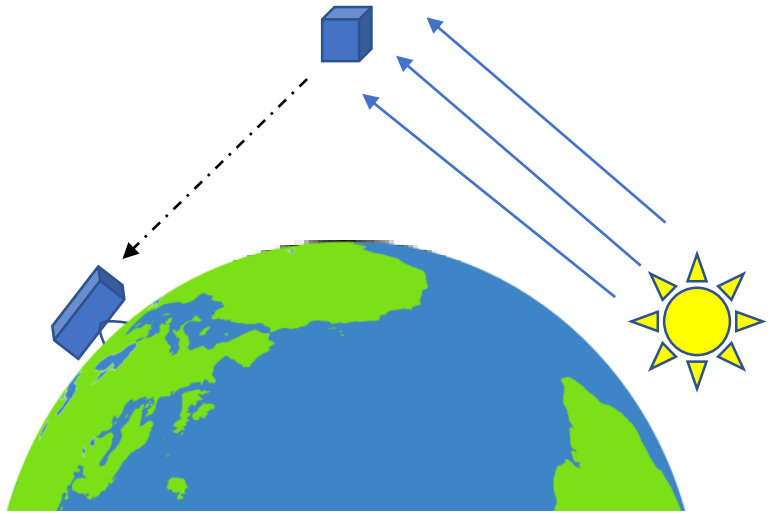
A system for probing the molecular composition of cold solar system targets, such as **asteroids, comets, planets,** and **moons** from a distant vantage, *e.g.* from orbit around the target

Orbiting space debris tracking modes

Active laser ranging
gated detection

Solar scattered light detection
CCD image or cw photon counting





Photon counting detector operated in both modes by electrical switching developed and tested by CTU for ESA 2018-2019

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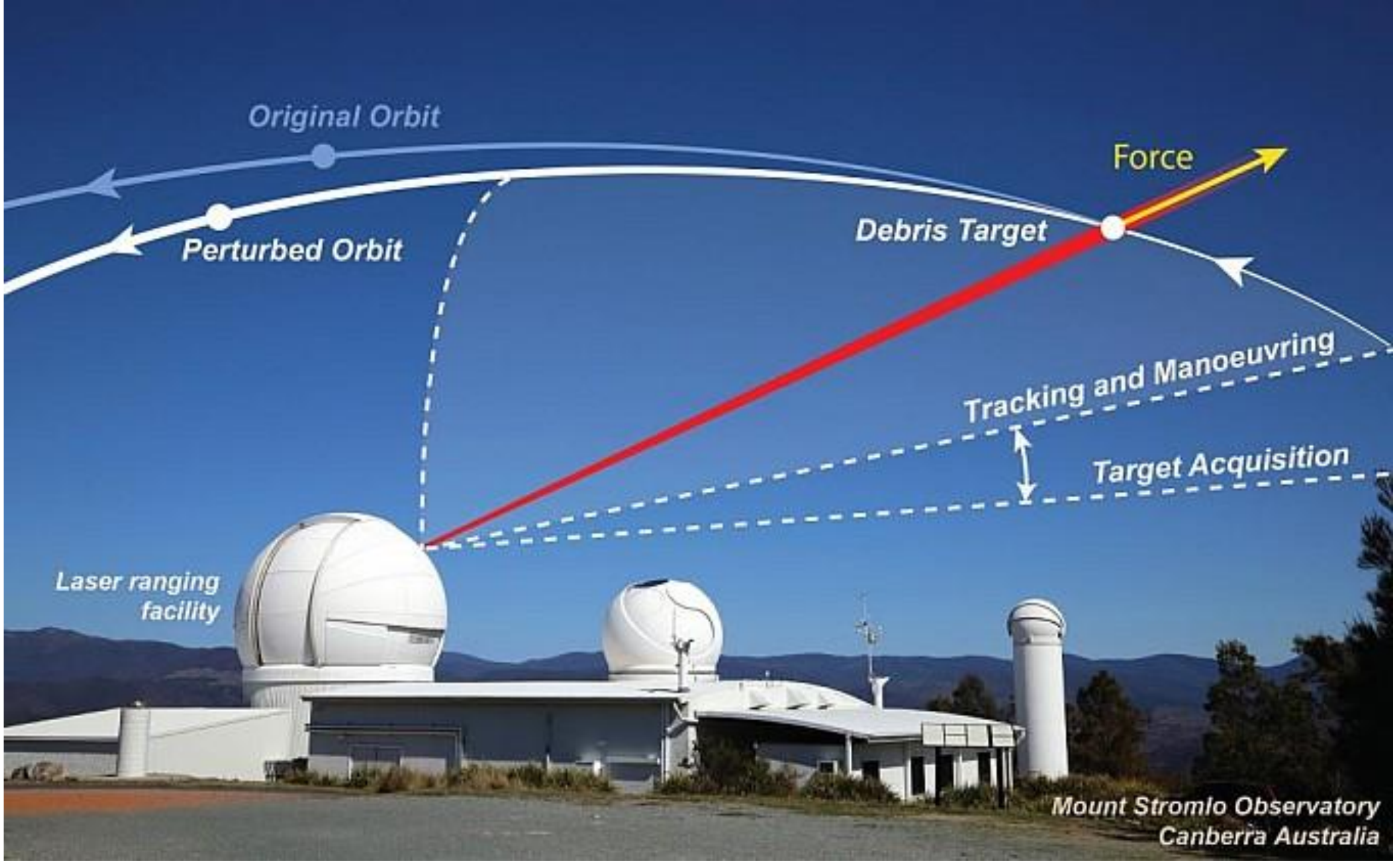
1. Standard Laser Ranging (cooperative targets)
2. Tracking of uncooperative targets
3. Influence the orbit of debris < 50g
4. Influence the orbit of debris > 1kg
5. Influence the orbits of objects > 1t (just-in-time collision avoidance)


Original Orbit
Perturbed Orbit
Force
Debris Target
Tracking and Manoeuvring
Target Acquisition
Laser ranging facility
Mount Stromlo Observatory
Canberra Australia

BREAKTHROUGH
INITIATIVES

Příležitosti

Laser SpaceApps: Peaceful Use of Lasers in Space, May 18-20 2020, Mikulov, Czech Republic

UNITED NATIONS Office for Outer Space Affairs

FACULTY OF SOCIAL SCIENCES Charles University

BREAKTHROUGH INITIATIVES

INSTITUTE OF INTERNATIONAL RELATIONS PRAGUE

- Pracovní skupiny, ustanovení konsorcia, společné projekty

- May 18, 8:45-17:00, Mikulov Castle, Introductions of the topics
- May 19, 8:45-17:00, Volarik Winery, Separate Technical Sessions
- May 20, 8:45-18:00, Volarik Winery, Joint Sessions,

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