

BIRDY

CubeSat concept in proximity operations for probing interior of SSBs



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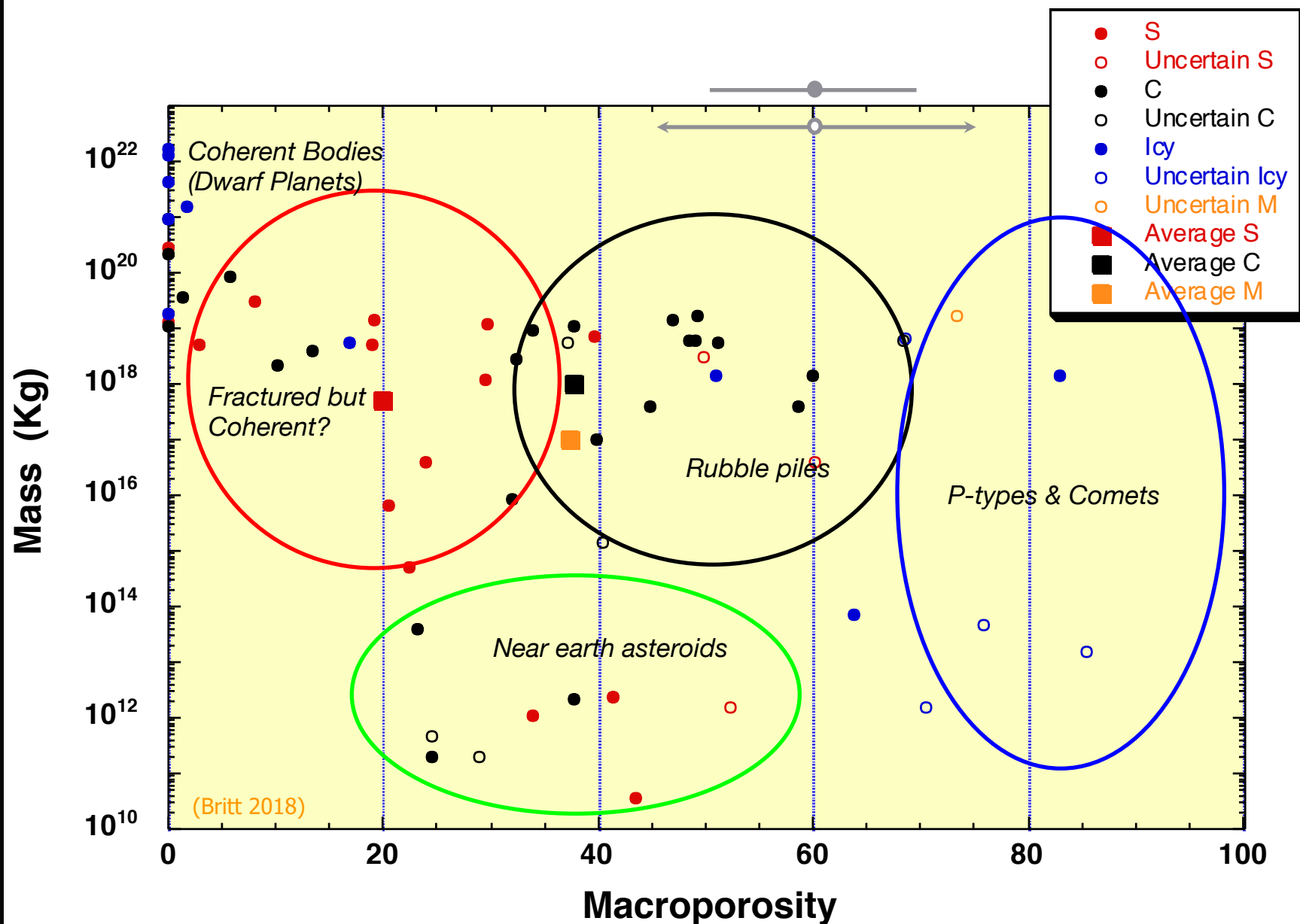
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*Acknow. S. Bertone, P. Rosenblat, B. Viswanathan,
NCKU, labex ESEP joint labs*

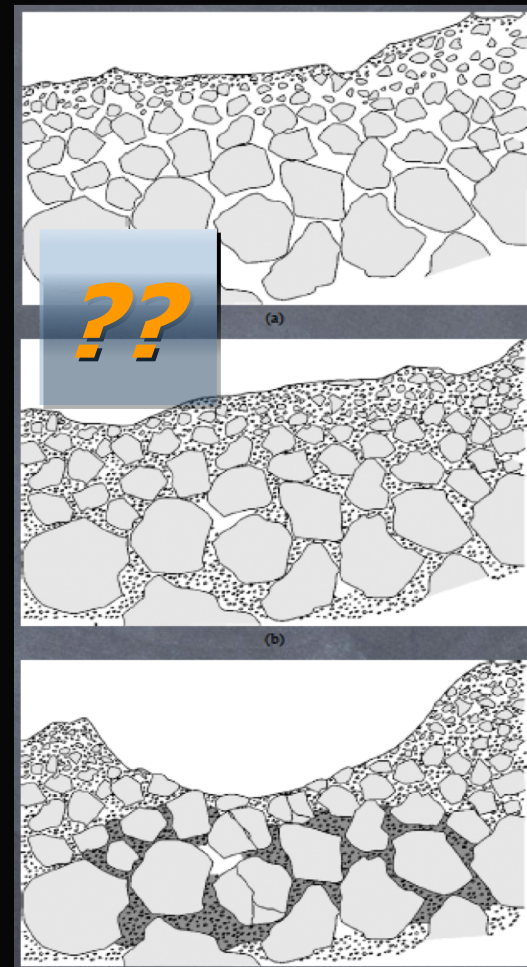
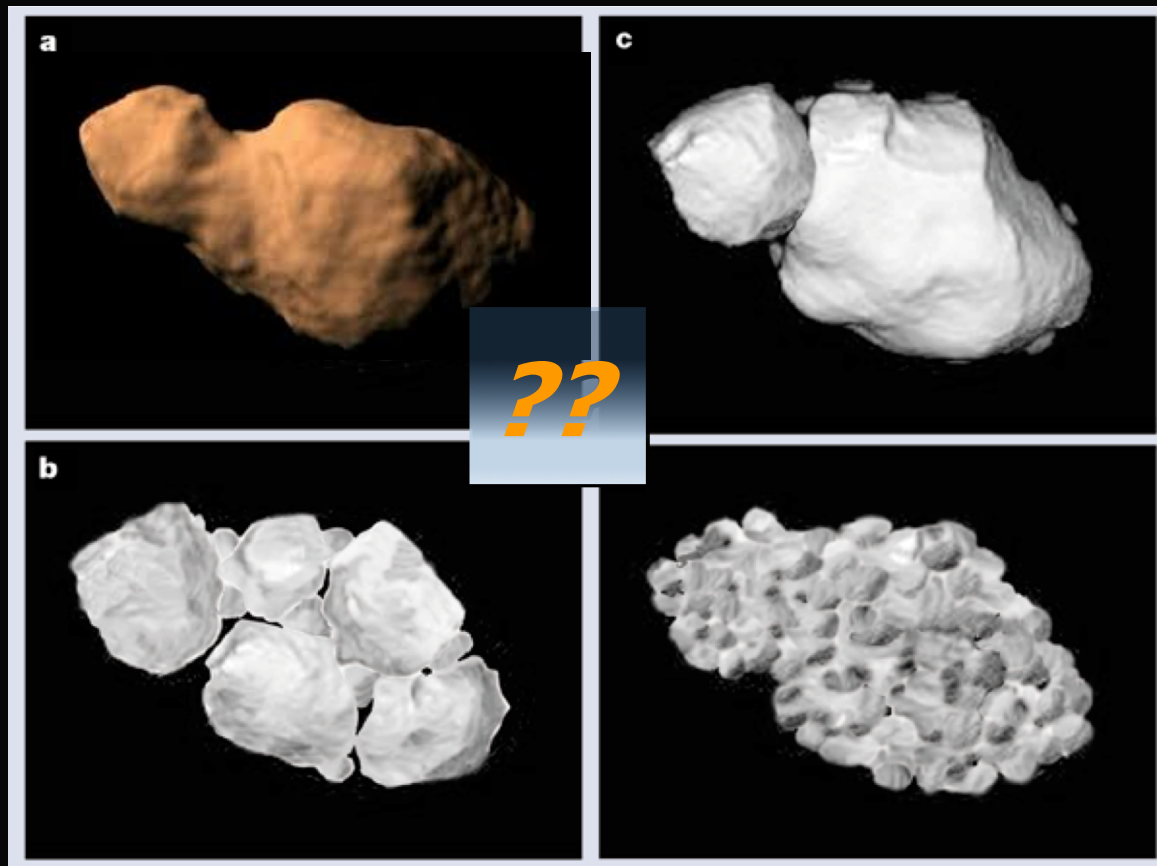
Session 6: high-TRL payload opportunities

HERA community workshop, Nov. 2018 Berlin

Aim: Probing interior: Mass+Density+Porosity



Internal Structure





Probing the Interior

- Derive mass & porosity
+ mass distribution
- Radio-science - Gravity field
 - orbits and/or multiple fly-bys
 - possibly combined with complementary instr.
tomography (HFR, LFR), seismography (accelero), ...
- Objective CubeSats for close flybys
 - mother/daughter-crafts inter-satellite links
 - one or more CubeSats (3U, 6U)
 - experience at NCKU (QB50), PSL (C²ERES)



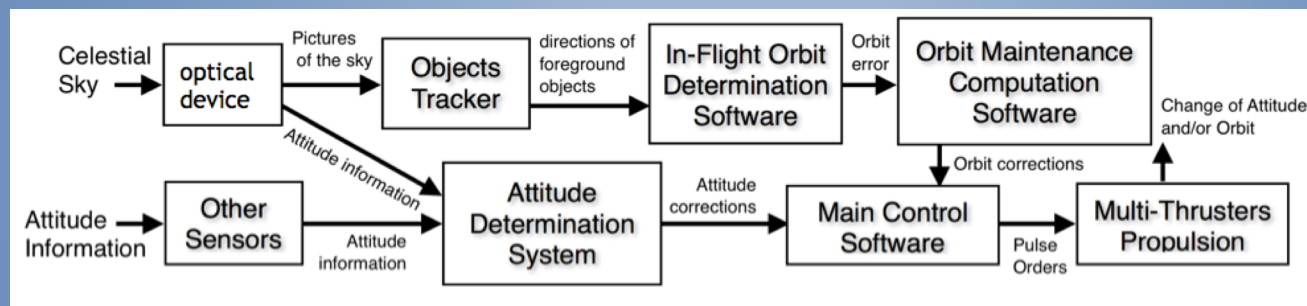
BIRDY CubeSat - Concept

- Techno development
- Propulsion – Attitude & orbit (PROP)
- AutoNav. – Object tracker (IFOD+TCM)
- Communication - Radio-science (POD)
- Multiple legs fly-bys, low altitude, low velocity

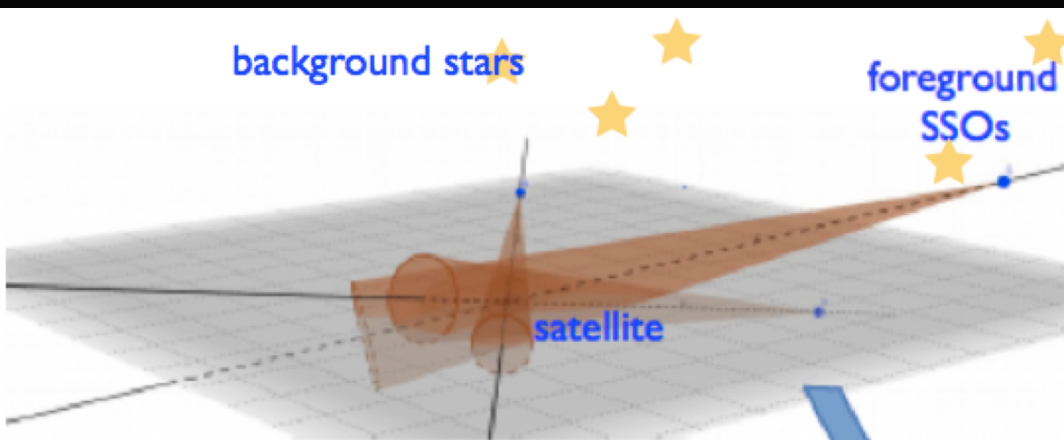


BIRDY CubeSat - Concept

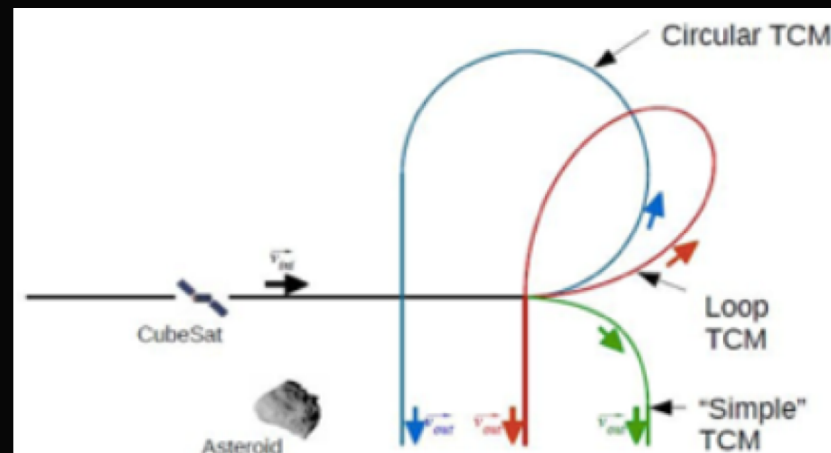
➤ On board IFOD & TCM



➤ Multiple legs fly-bys, low altitude, low velocity

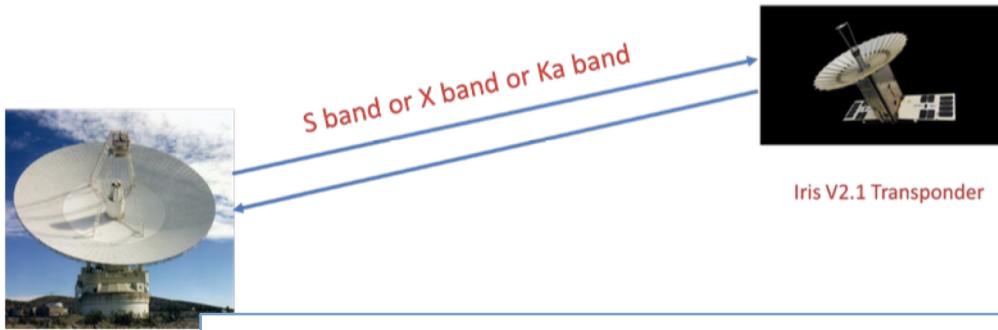


Asynchronous triangulation



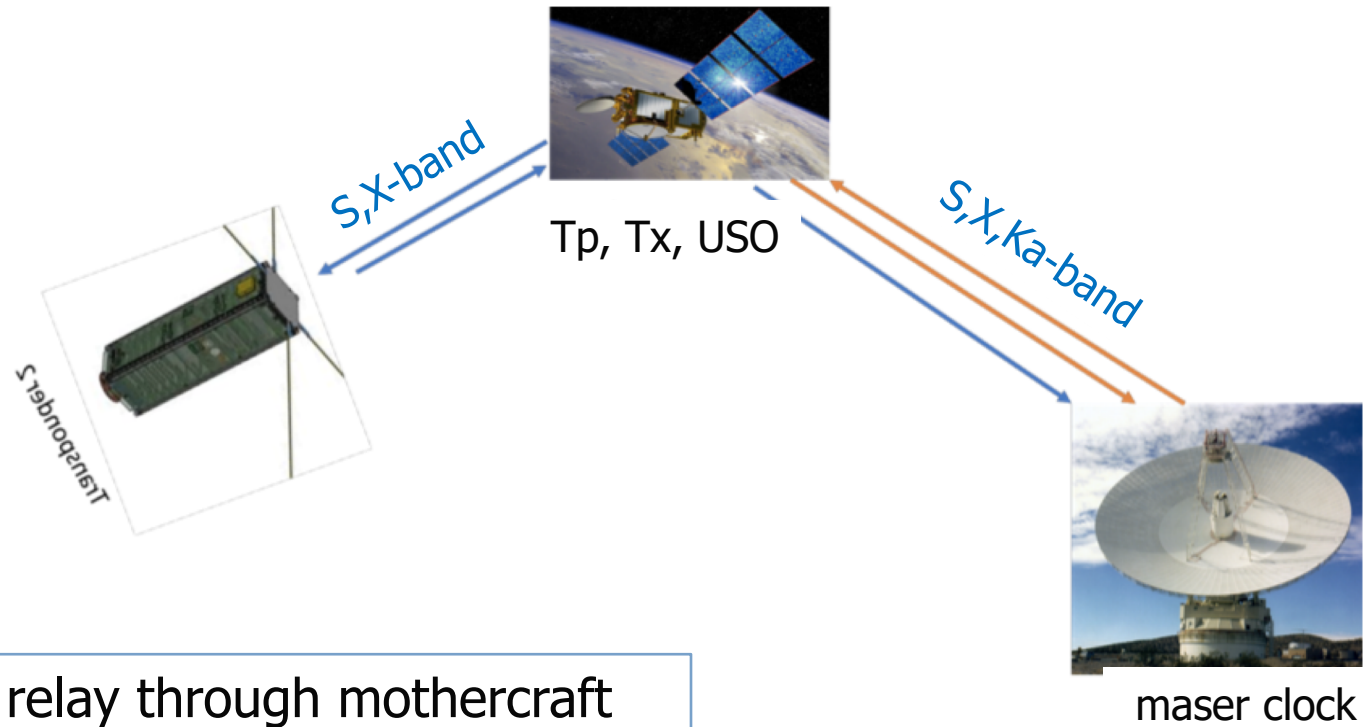
Continuous propulsion

BIRDY CubeSat - Concept



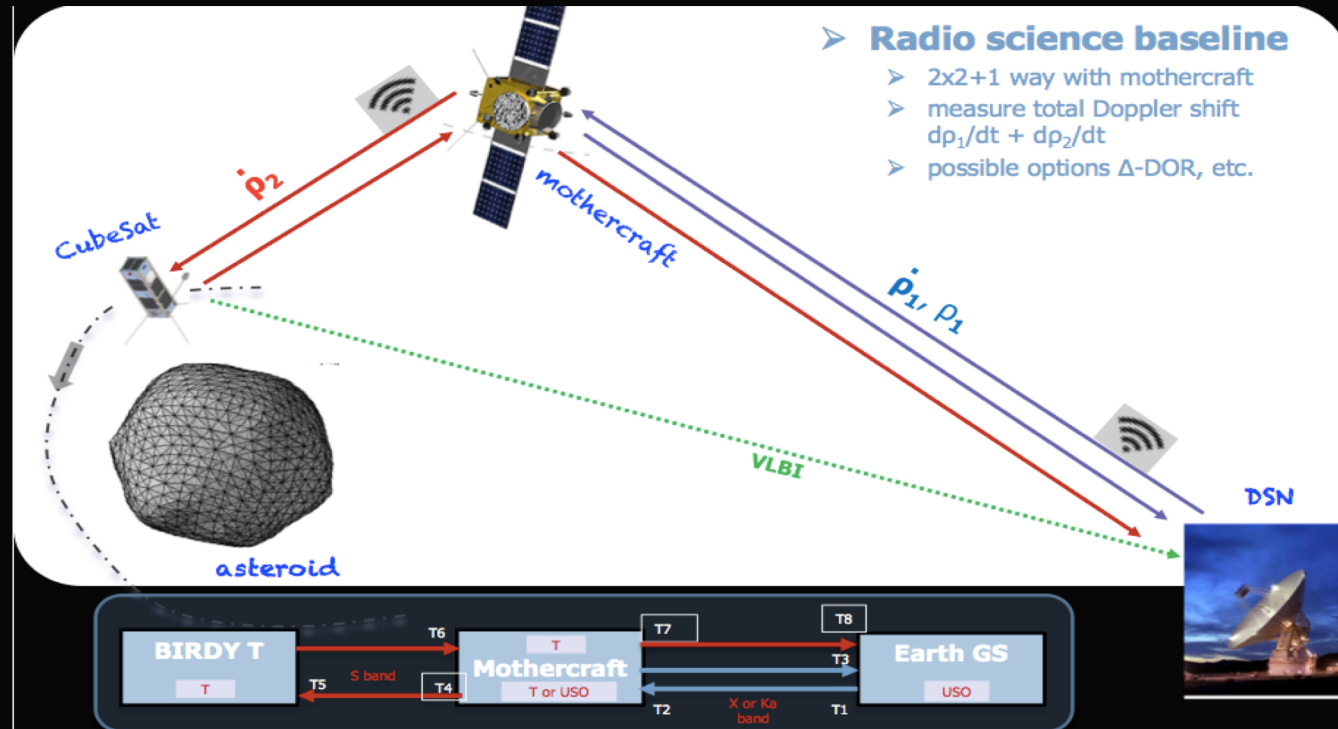
Direct link – not realistic :-/

Inter-satellite(s)
communication



relay through mothercraft

BIRDY CubeSat - Concept



➤ Basis of 60s integration, Doppler

- Ka+S band 0.04 [mm/s]
- S+S band 0.09
- Ka+X band 0.03

➤ Objectives

- go <1km, speed 10-50 cm/s
- extract mass from Didymoon
- provide additional C_{20} C_{22} info for Didymos



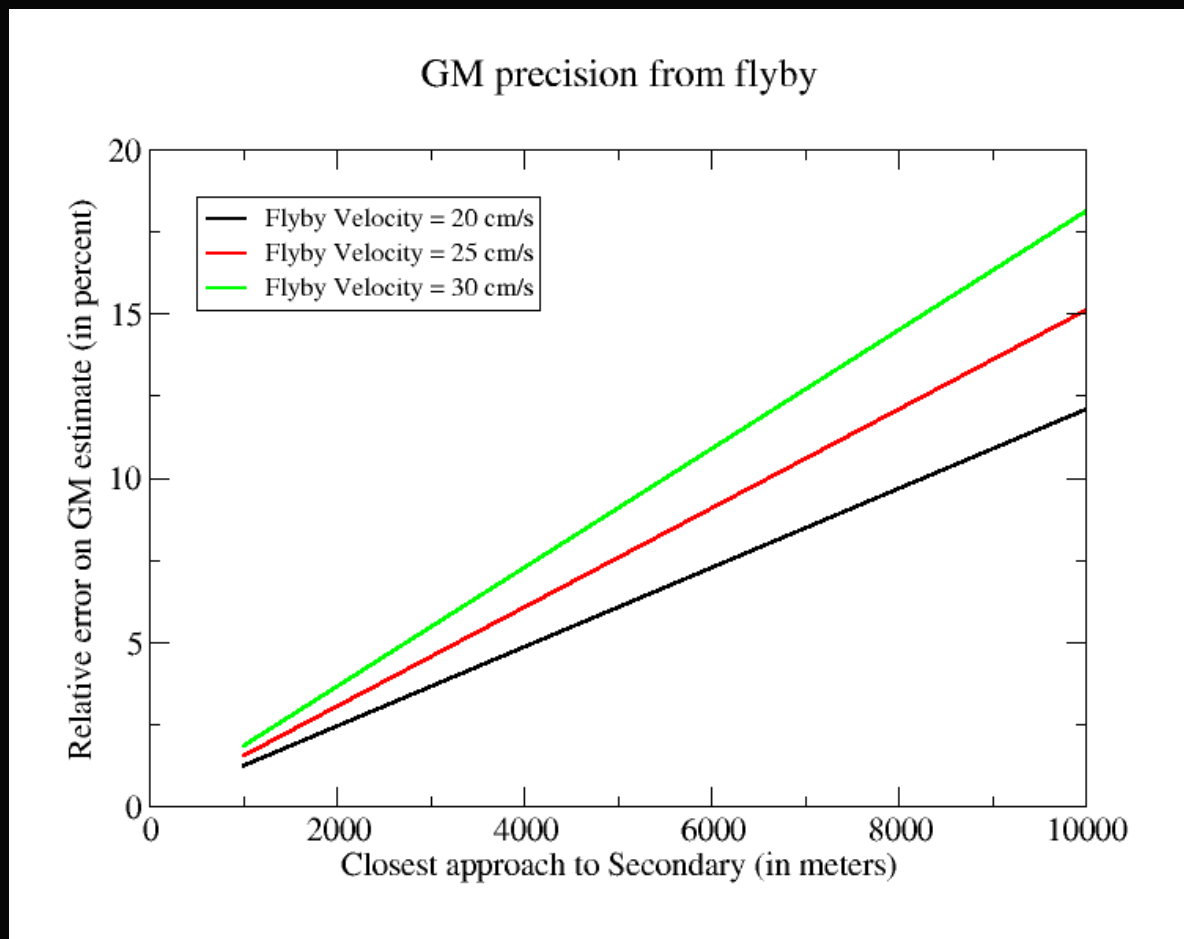
BIRDY Development Roadmap

- BIRDY EM & BIRDY-T
- EarlyBird
 - standalone tests in Earth or Lunar orbit
 - propulsion, navigation, hardening, radio-sci
- BIRDY sci.
 - Radio-science++
 - Deep-space flight with mothercraft



GM on DidyMoon

- 0.02 mm/s @60s
- no primary...





BIRDY Development Roadmap

