

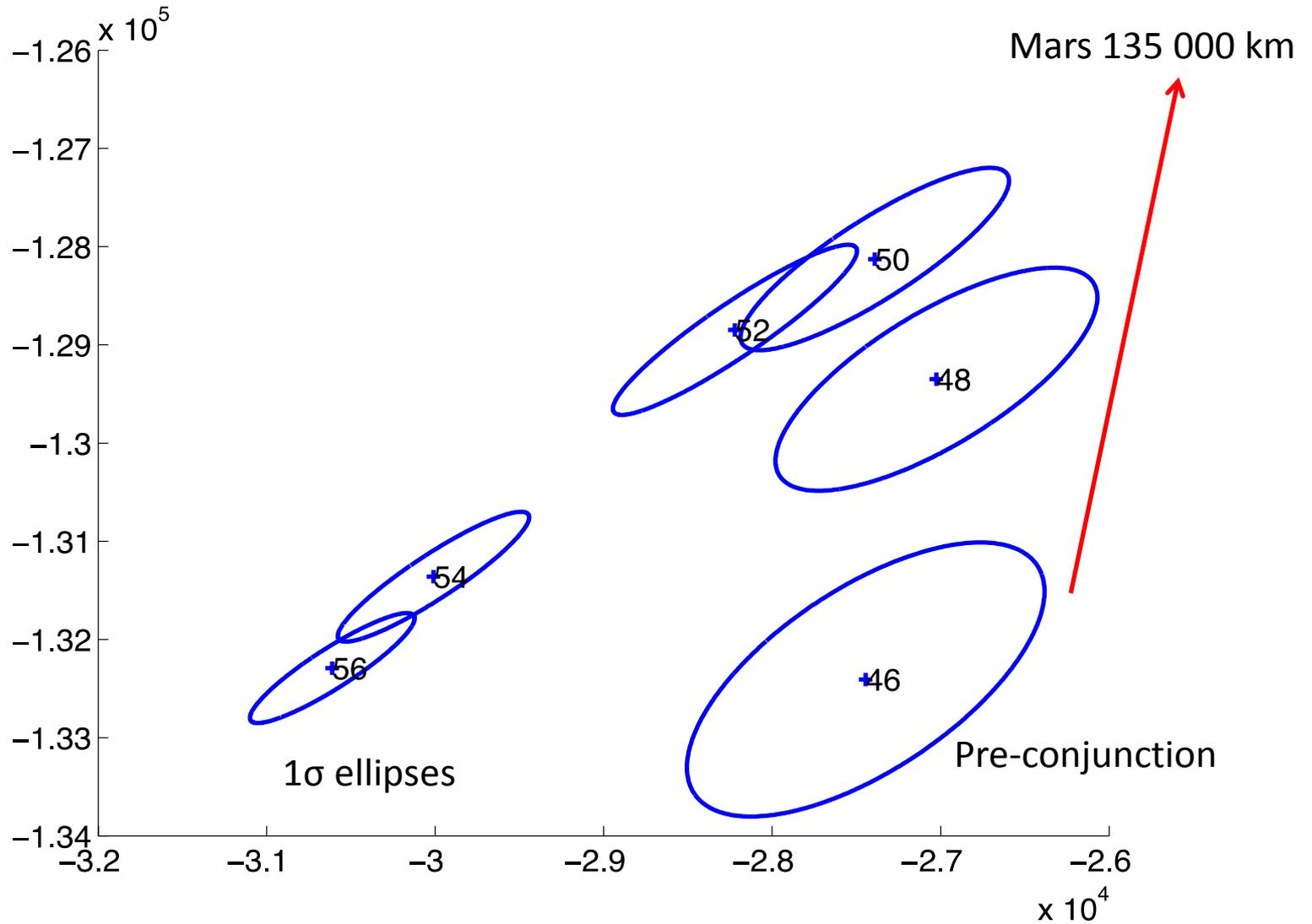


# Comet ephemeris update

D. Farnocchia, S.R. Chesley (JPL, Caltech)

M. Micheli (ESA NEOCC)

# Comets don't like sigmas



# Comet astrometry is complicated

Asteroid



Comet



# Selection of the astrometry

- Pre-conjunction observations
  - Tholen, Mauna Kea (rigorous uncertainty)
  - Pan-STARRS
  - Siding Spring Survey
  - Kitt Peak
- Post-conjunction data
  - San Pedro de Acatama positions measured by Marco Micheli Astrometric
- Used solution based on reliable data only to select additional observations
  - Observatory code
  - Program code, i.e., observer

# Nongravitational perturbations

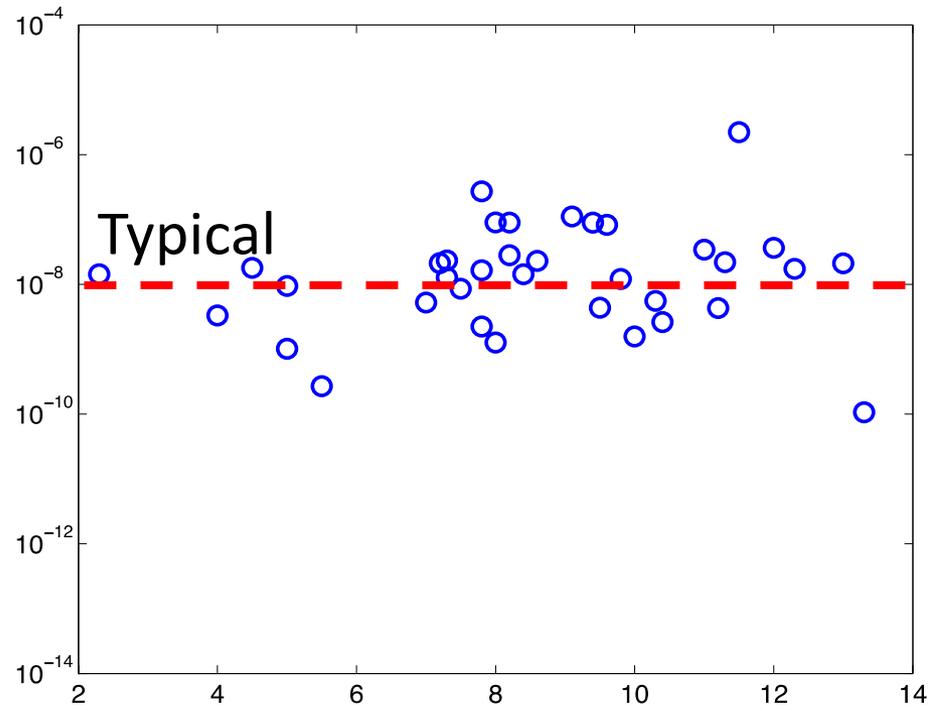
$$a_{\text{NG}} = g(r) (A_1 e_R + A_2 e_T + A_3 e_N)$$

Nongravs  
decrease with  
heliocentric  
distance

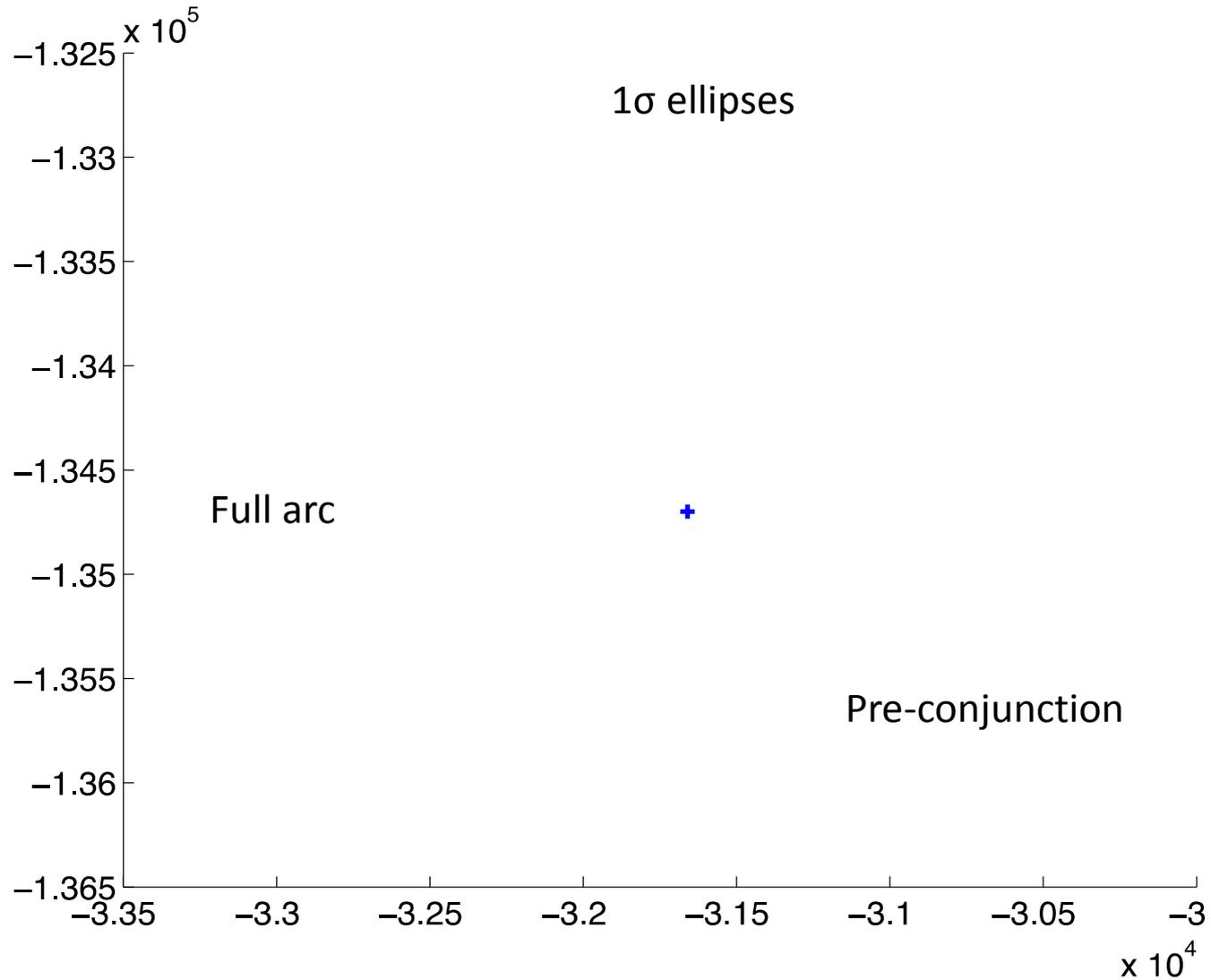
Unknown  
parameters

No detected nongravs in the  
astrometry.

A priori  $A_1 = 10^{-8} \pm 10^{-8} (3\sigma)$

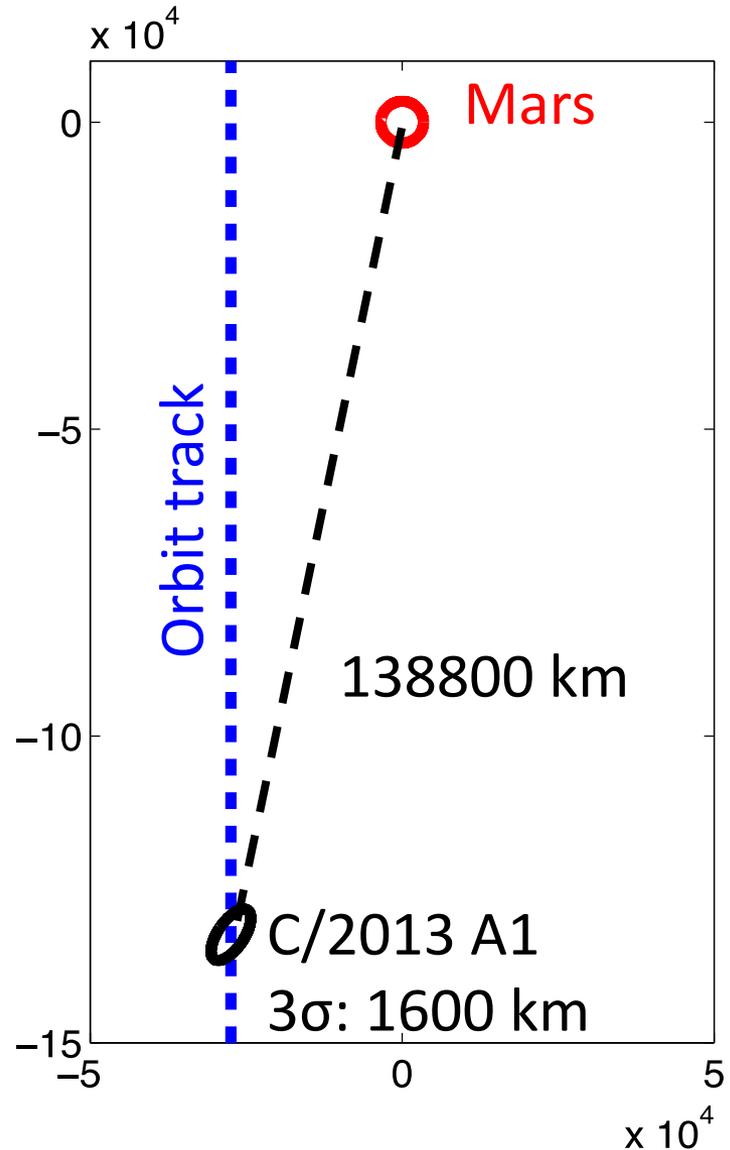


# Reliable data only



# The close approach

- 56 km/s relative velocity
- Oct 19, 2014  
18:27:20 UTC  $\pm$  45 s ( $3\sigma$ )
- 138800 km  $\pm$  1600 km ( $3\sigma$ )
- Minimum orbital distance  
32500 km
- C/2013 A1 arrives 175 min  
earlier than Mars



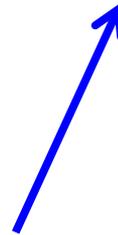
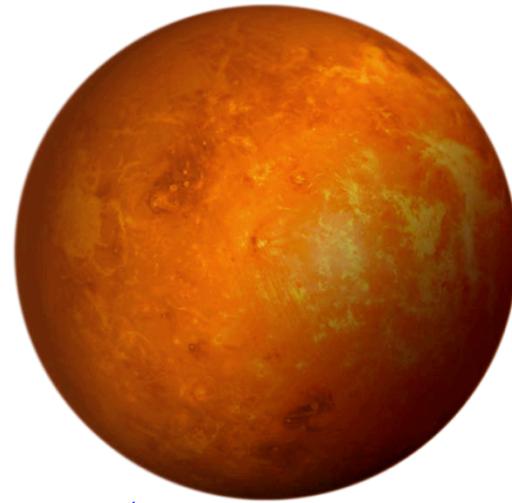
# Observing and hiding: yes we can!

Closest approach at 18:27:20 UTC



101 minutes

Fluence peak close to the time that Mars crosses the orbital plane of C/2013 A1: 20:08:30 UTC



Incoming dust

$RA_{J2000} = 41^\circ$

$DEC_{J2000} = -16^\circ$

# Observation planning

- Need to decrease the prediction uncertainty to make sure the comet is in the field of view
- Astrometry is becoming more and more unreliable
- Please, continue observing the comet
- Contact me ([Davide.Farnocchia@jpl.nasa.gov](mailto:Davide.Farnocchia@jpl.nasa.gov)) if you have images we can use to get astrometric positions, especially recent ones