

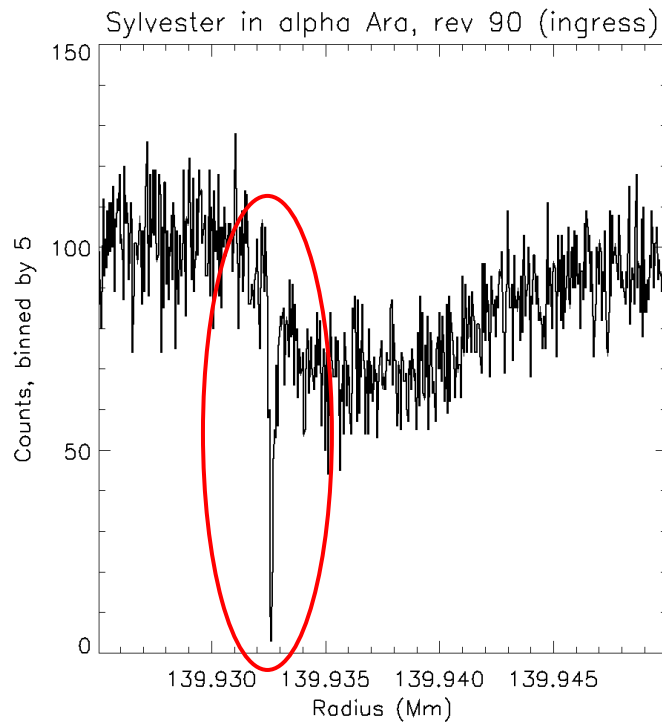
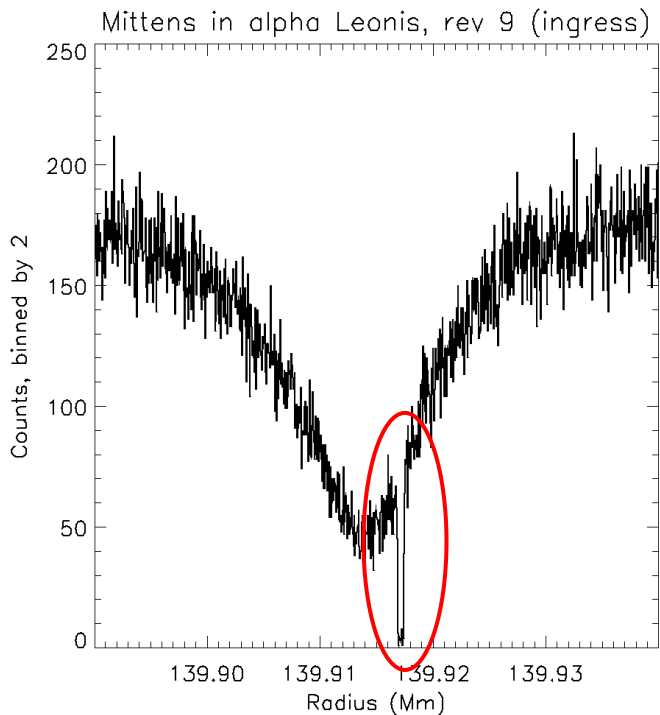
Tracking Features in A-Ring Density Waves

Morgan Rehnberg, L.W. Esposito, M. Sremčević, N. Albers

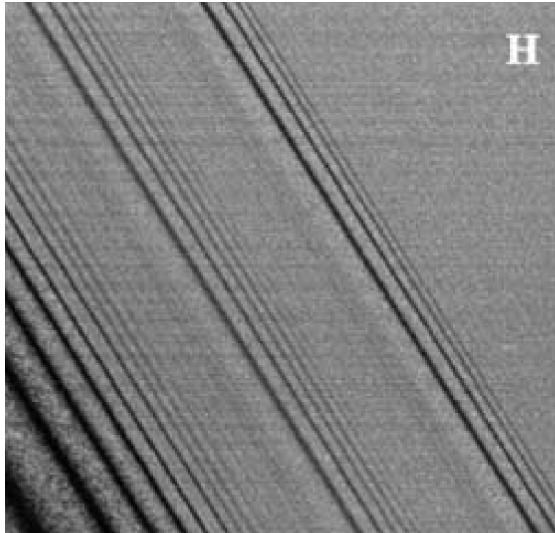
University of Colorado - Boulder

Features in the F ring

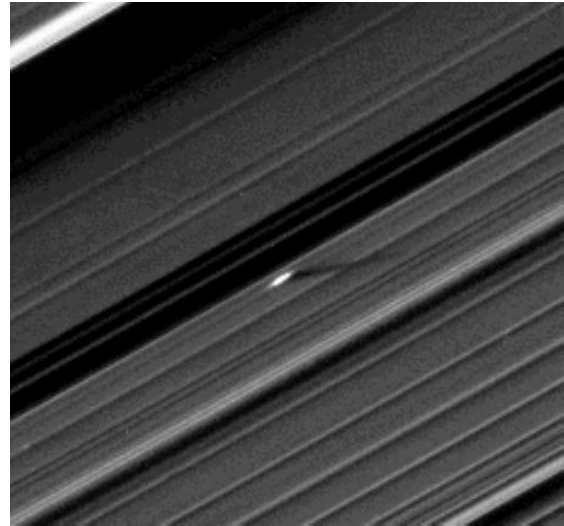
In 150 occultations, 56 features observed



Why search the A ring?



Straw as identified by Porco, et al. (2005)



A-ring propellor moonlet as identified by Tiscareno, et al. (2010)

The data

UVIS stellar occultations

A-ring occs: ~110

Timespan: May 2005 - July 2014 (revs 8 - 206)

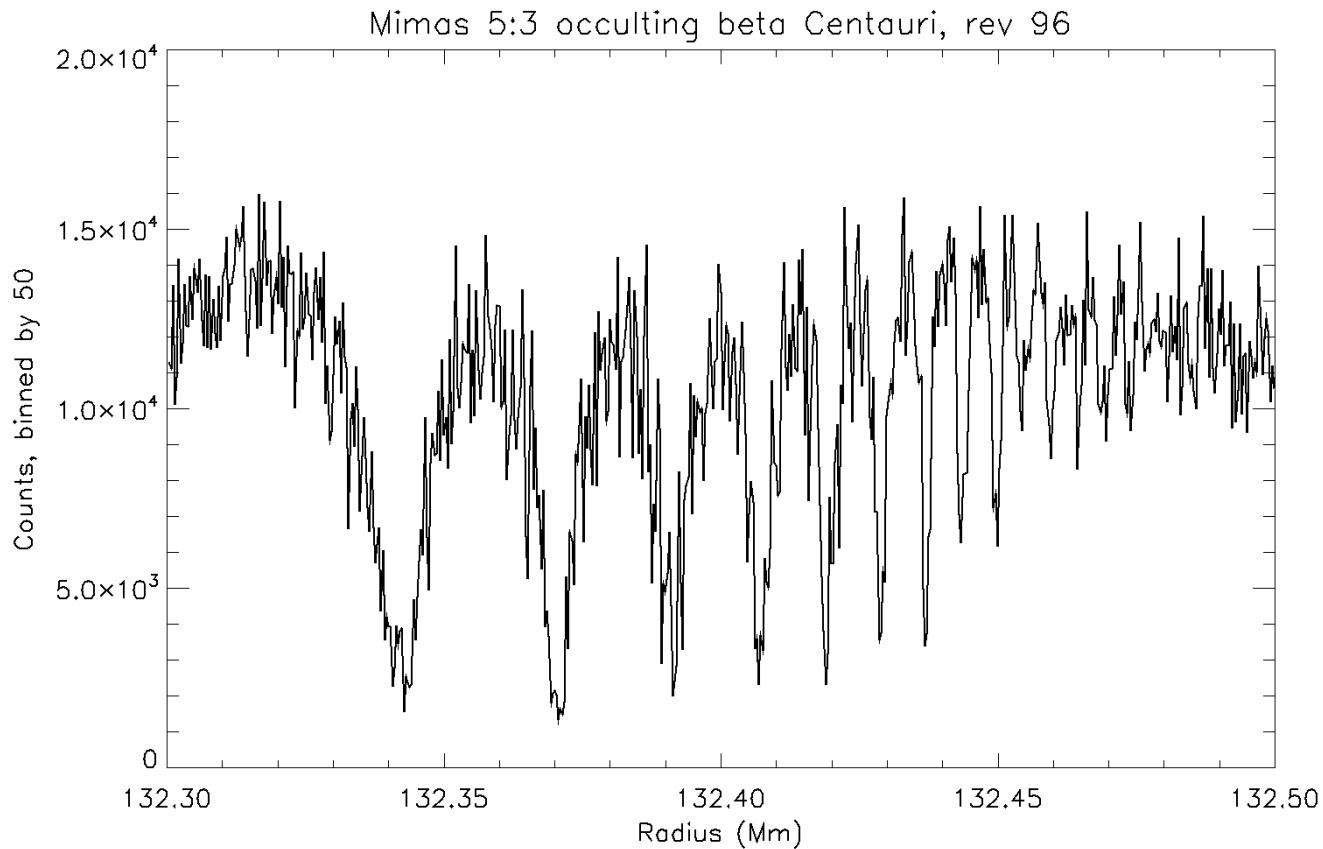
Resolution: 1.6 - 185 m/px, typical: ~15 m/px

Search region

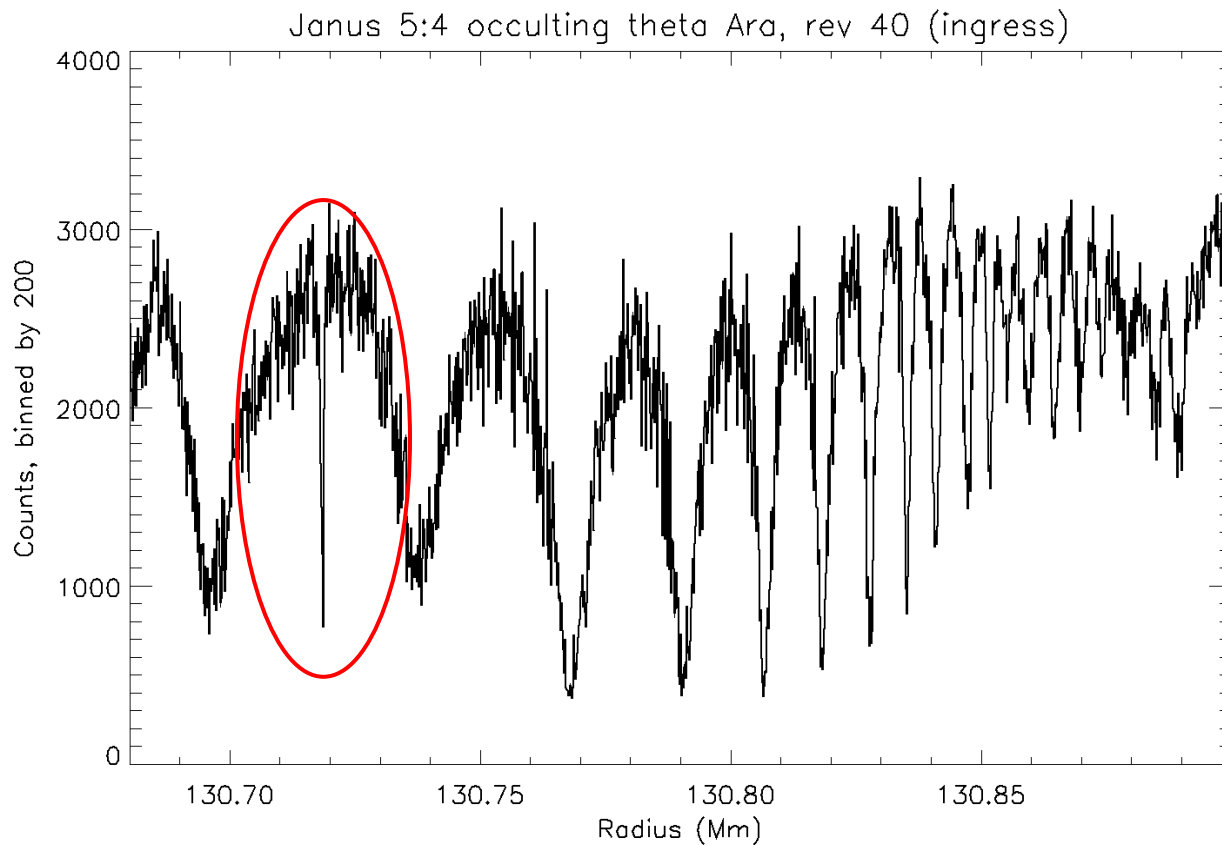
Five strong spiral density waves:

- Janus 5:4 ($r = 130,701$ km)
- Janus 4:3 ($r = 125,268$ km)
- Mimas 5:3 ($r = 132,298$ km)
- Prometheus 31:30 ($r = 136,389$ km)
- Prometheus 14:13 ($r = 132,716$ km)

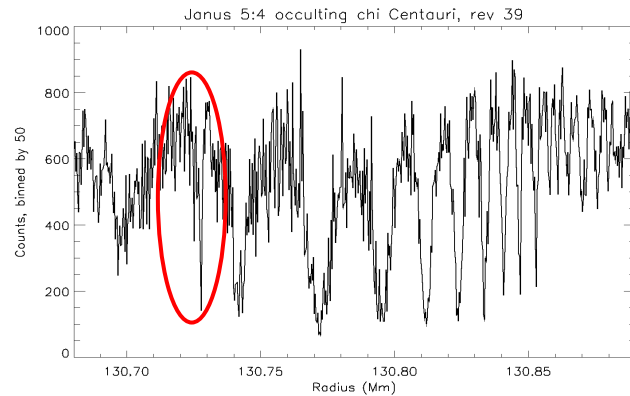
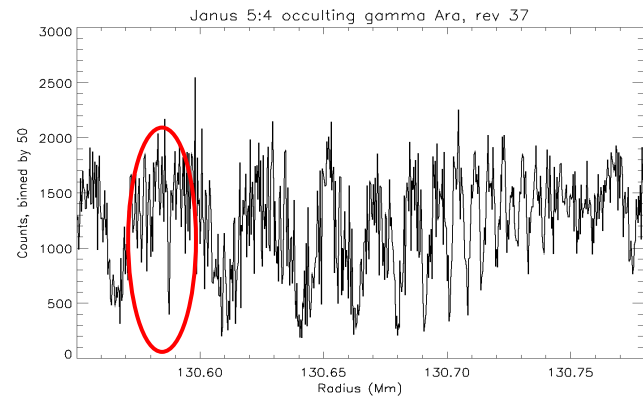
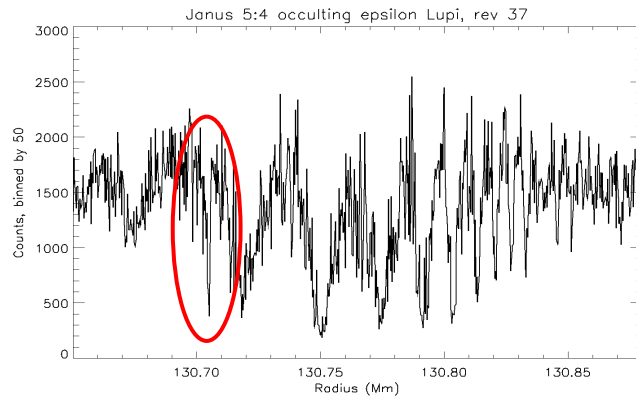
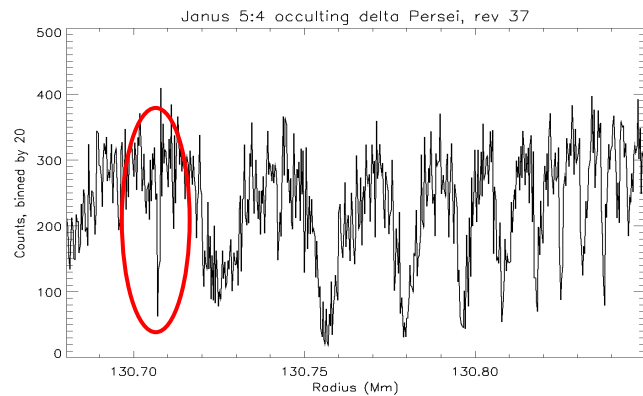
Typical density wave



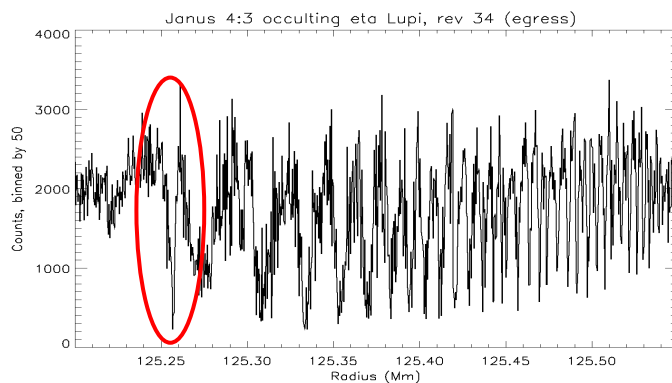
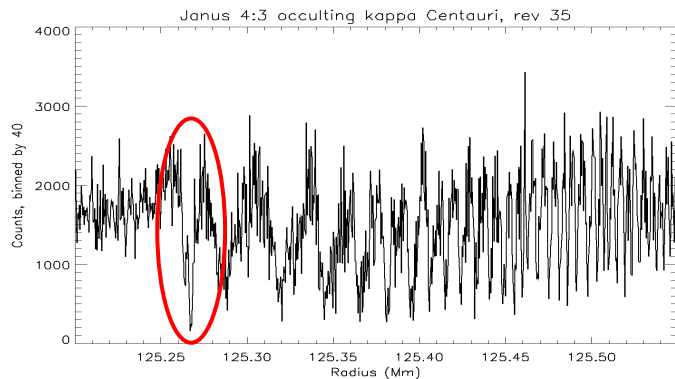
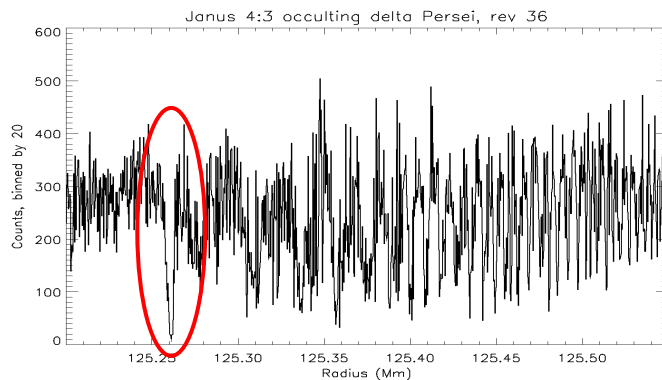
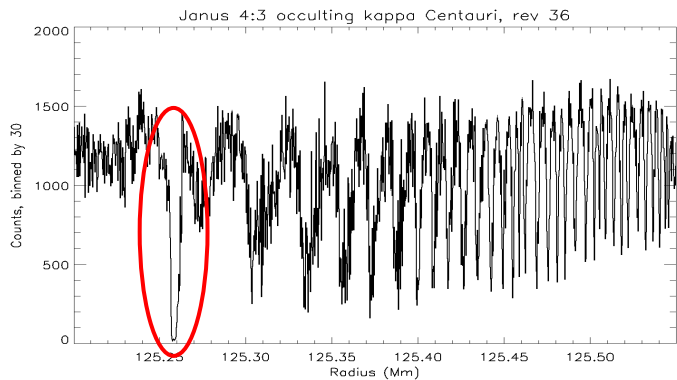
An interloper appears



More appearances in Janus 5:4



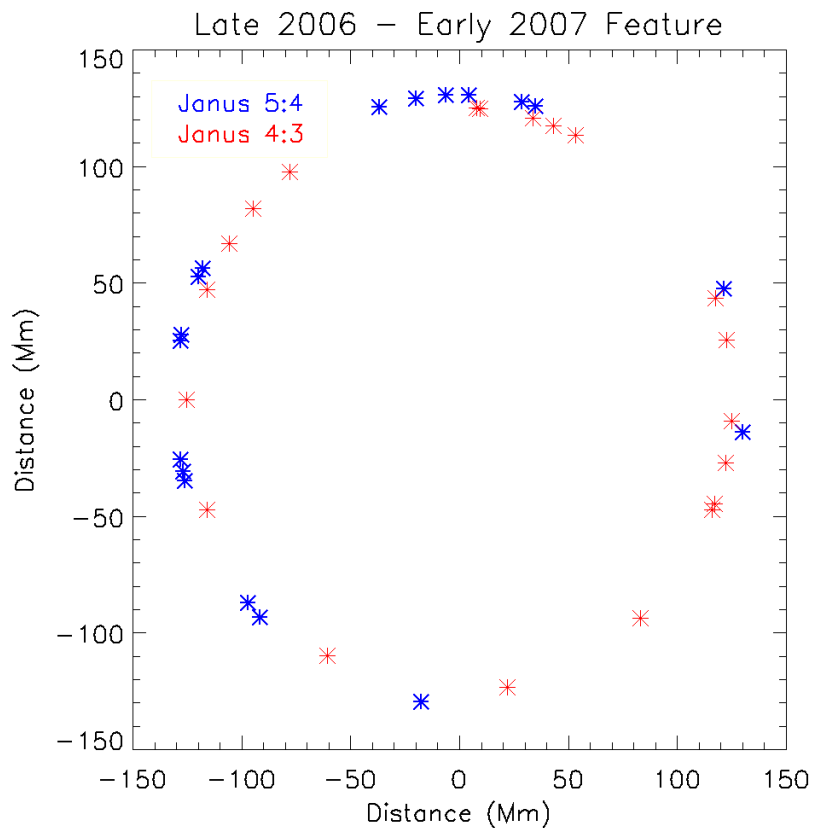
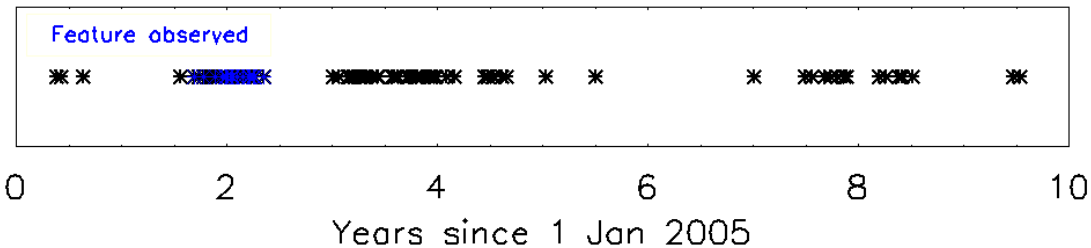
A similar feature in Janus 4:3



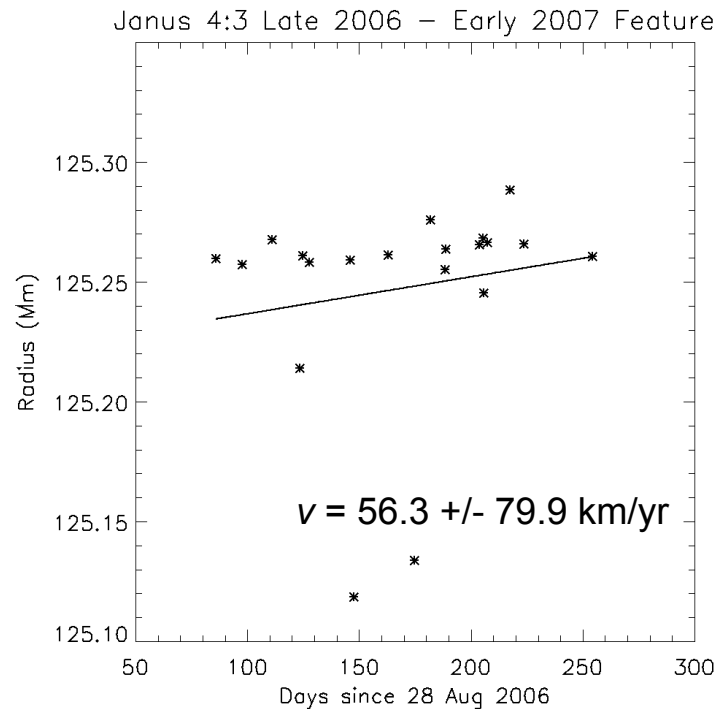
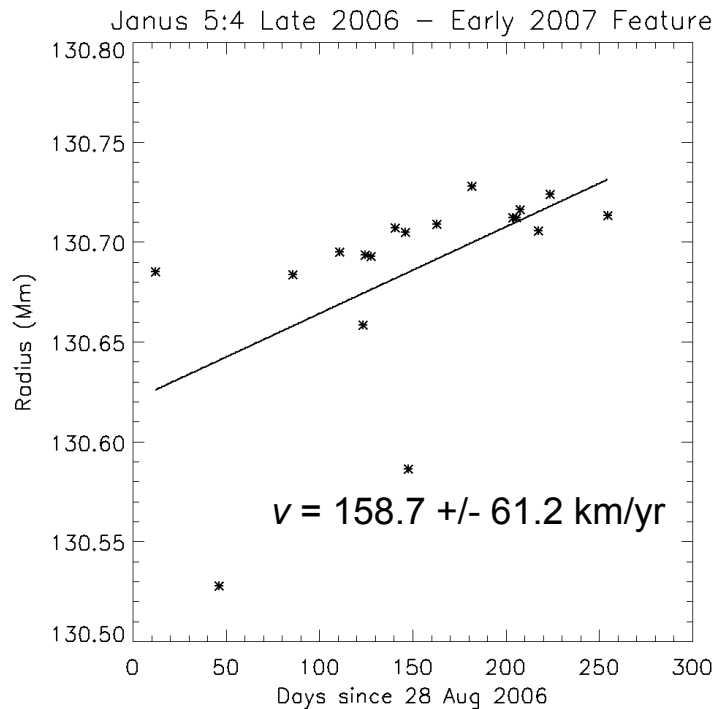
Late 2006 - early 2007 feature

Spiral density wave	Times feature observed	Earliest observation	Latest observation
Janus 5:4	18	9 Sept 2006 (rev 28)	9 May 2007 (rev 44)
Janus 4:3	20	21 Nov 2006 (rev 33)	9 May 2007 (rev 44)

Observation History of Feature

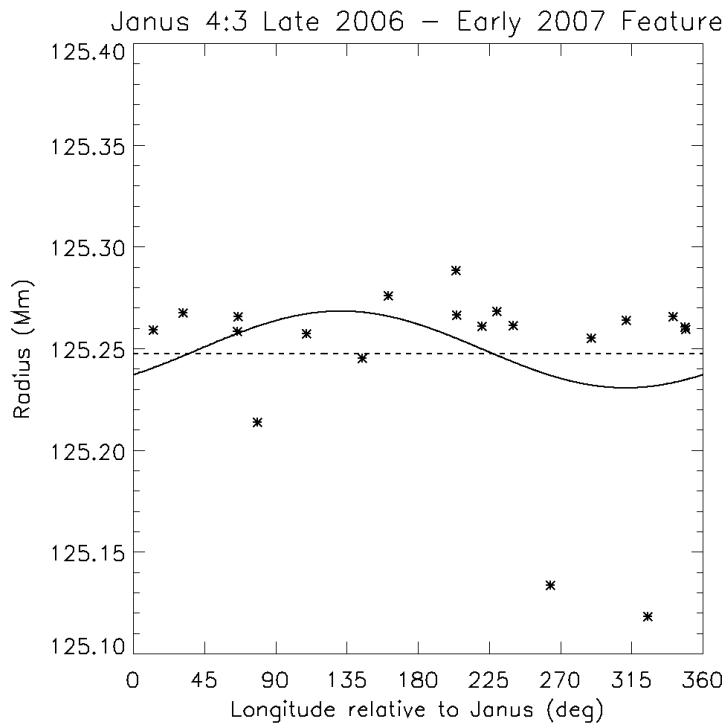
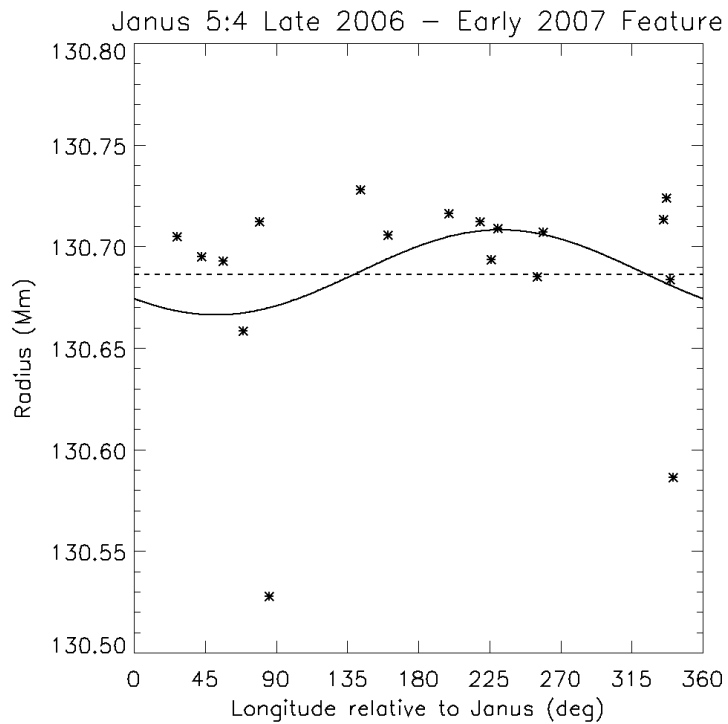


Radial motion



$v_g = 15.3$ km/yr
(assuming $\sigma = 30$ g/cm²)

No longitude relationship to Janus



These best-fit sinusoids are not better fits than a simple mean

Related to Janus?

Feature not yet observed in other density waves

- Mimas 5:3, Prometheus 31:30, 14:13 show overall less variation
- Porco, et al. (2005) report most visible straw in Janus 6:5, 4:3

Related to Janus?

Janus/Epimetheus switch every 4.0 years (20 Jan)

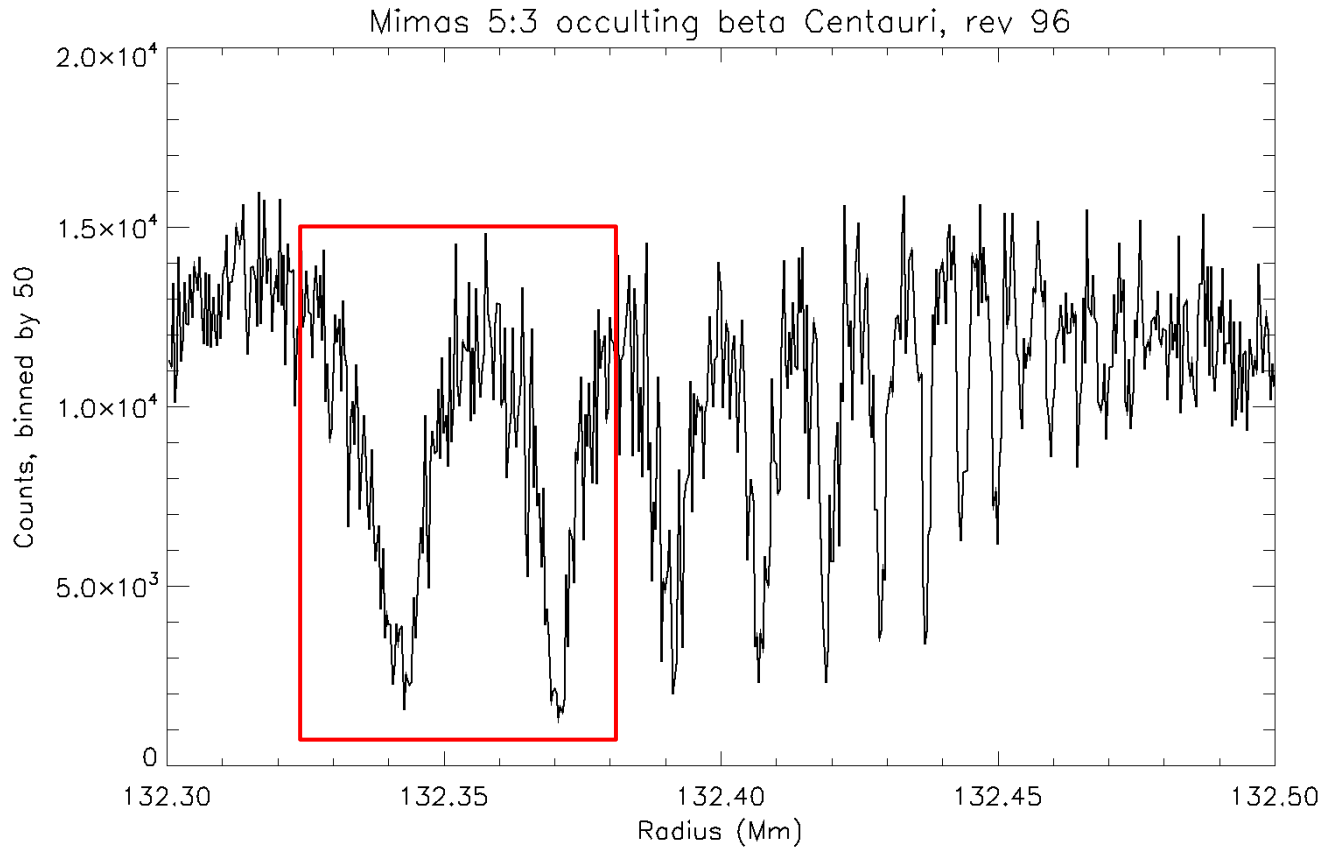
- First observed ~ 8 months after 2006 switch
- Not observed after 2010 switch
- Not (yet!) observed after 2014 switch
 - Same switch as 2006
 - Still only 6 months out

Summary

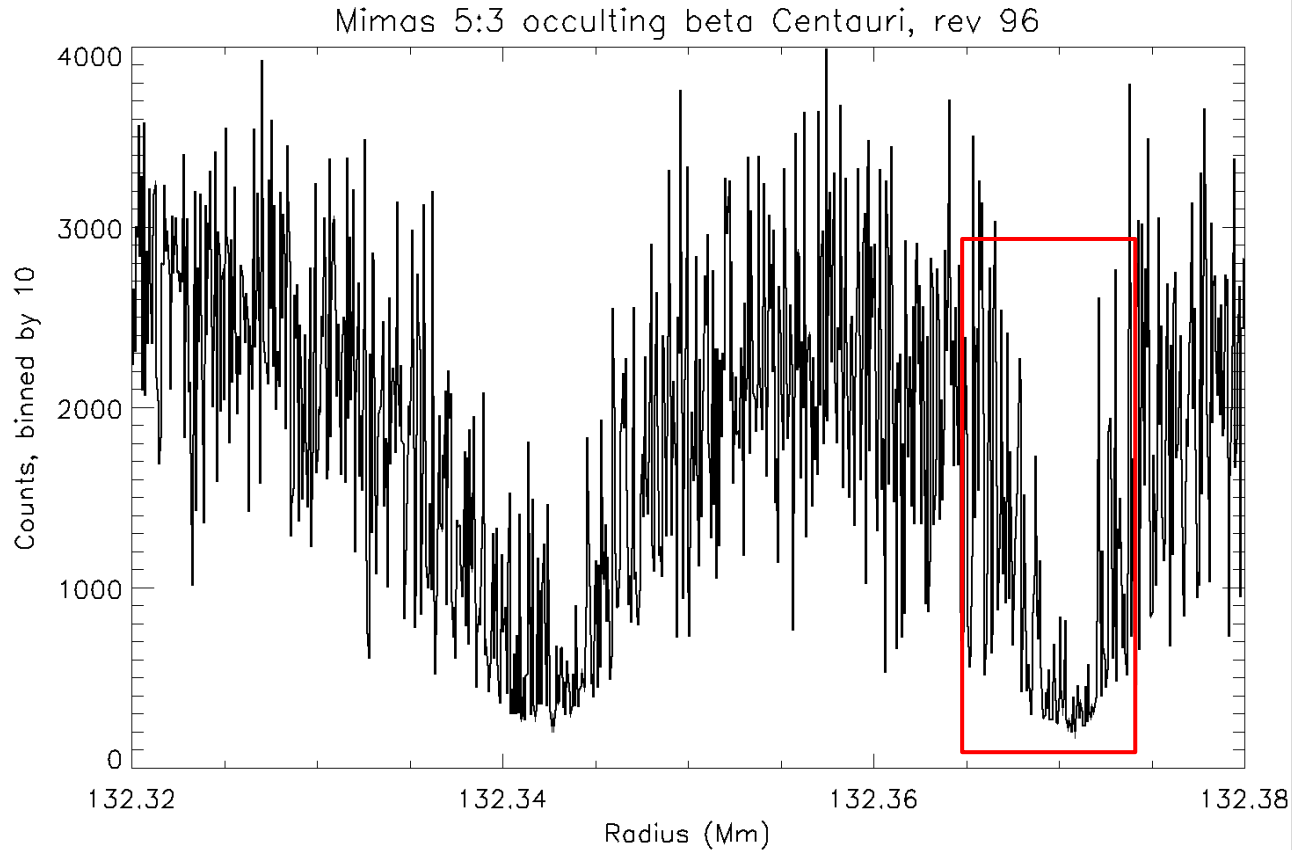
- Feature observed in Janus 5:4, 4:3 DWs
- Feature **not** observed in other DWs
- Feature appears to have full azimuthal extent
- Relationship to Janus/Epimetheus switch?
- What happens to the feature?

Extra slides

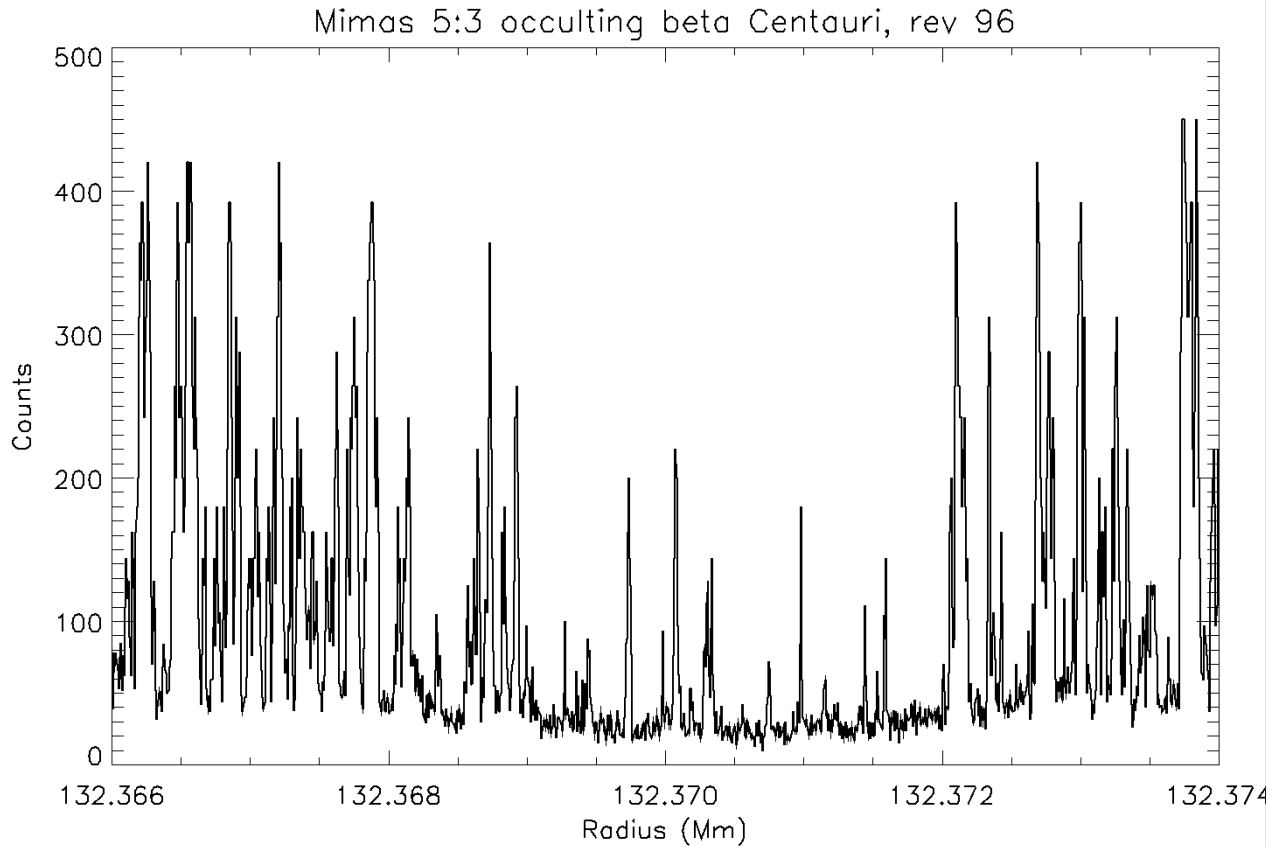
Typical observation



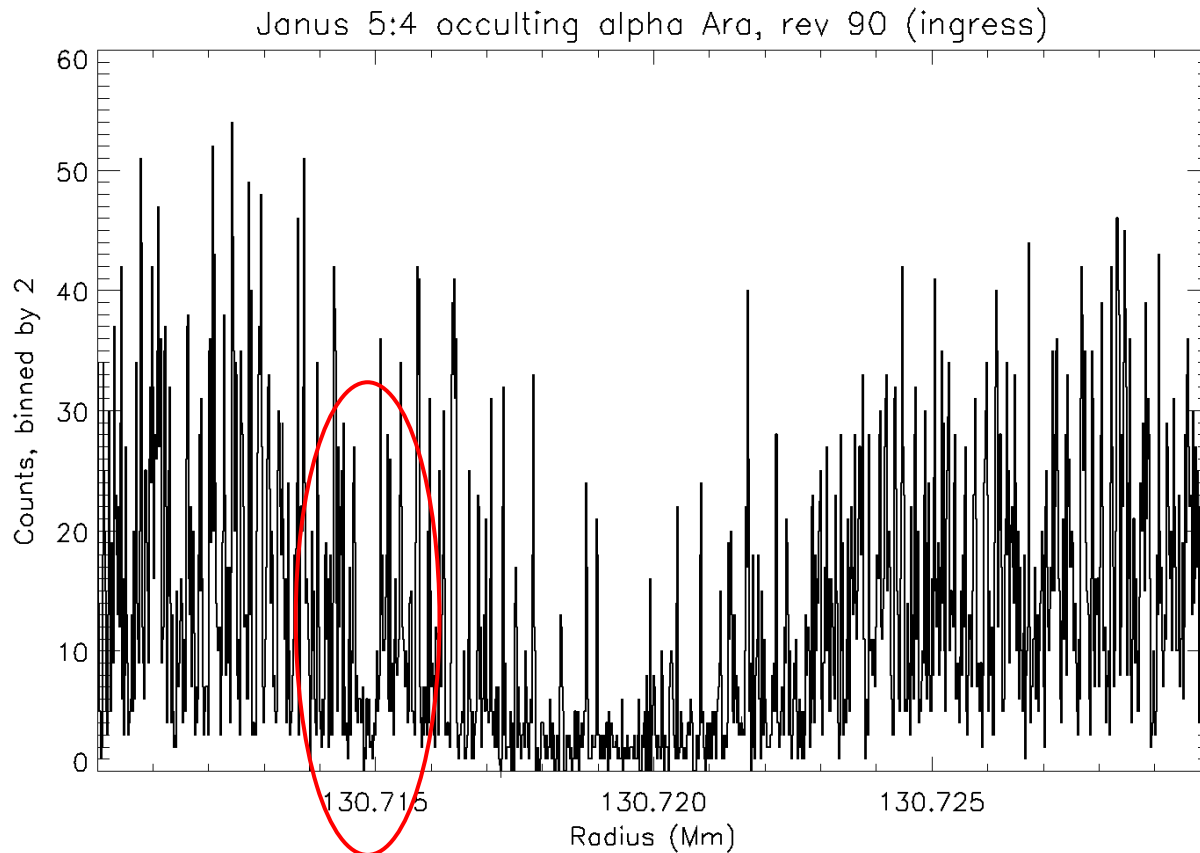
Typical observation



Typical observation



Kitten-like structures



“Folded tips”

