



Gaia impact in the study of Chariklo's ring system

Diane BÉRARD^(1,2), B. Sicardy^(1,2), J.I.B. Camargo⁽³⁾, J. Desmars⁽¹⁾, R. Vieira-Martins⁽³⁾, F. Braga-Ribas⁽⁴⁾, A. Crispim⁽⁴⁾ + Observations Teams

⁽¹⁾ Obs. de Paris/LESIA, France

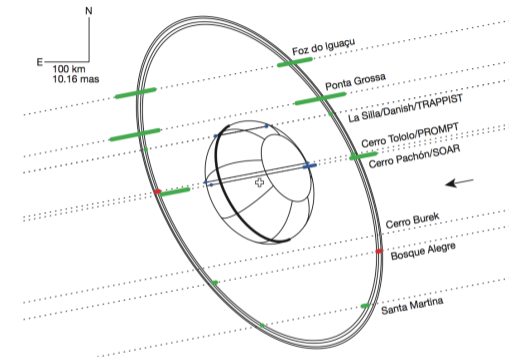
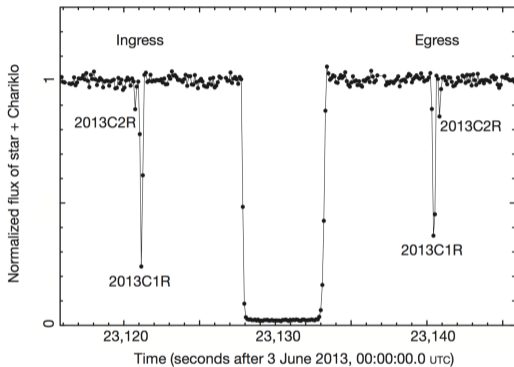
⁽²⁾ UPMC, France

⁽³⁾ Obs. Nacional, Brazil

⁽⁴⁾ UTFPR, Brazil

27 avril 2017

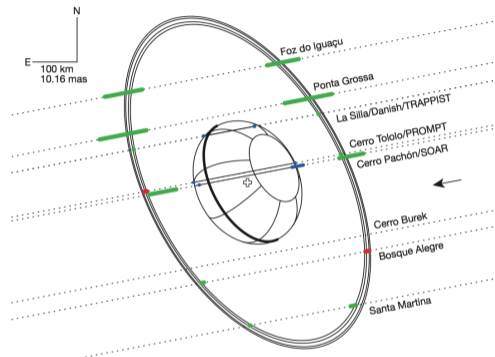
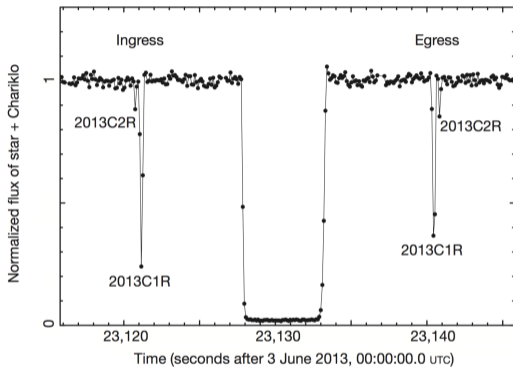
The discovery of rings around Chariklo



(Braga-Ribas *et al* 2014, Nature 508)



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- C1R : $r \sim 391$ km, $w \sim 7$ km, $\tau \sim 0.4$
- C2R : $r \sim 405$ km, $w \sim 3$ km, $\tau \sim 0.06$
- Gap between the two rings 14.2 ± 0.2 km → Constraints on the orientation and physical parameters of the rings



How to observe Chariklo and its rings ?

- Chariklo main body diameter ~ 250 km ~ 25 mas projected in the sky plane
- Chariklo rings diameter ~ 800 km ~ 80 mas
 - Direct imaging is very challenging
 - BUT stellar occultations allow sub-km accuracy



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 - BUT stellar occultations allow sub-km accuracy
- Pre Gaia prediction accuracy $\sim 30 - 40$ mas ($\sim 300 - 400$ km) - *See J. Desmars talk*

Nevertheless, between 2014 and 2016 : **14 new positive observed occultations** (out of about 30 attempts)



Interesting facts about Chariklo's rings

- Variations in C1R inner structure,
- Variations in gap distance between the two rings
- Variations in radial width (between 5 and 7 km for C1R and between 0.1 and 1 for C2R)
→ possible evidence of rings eccentricity,
- C1R is sharp-edged (less than 1 km to enter the ring),



Interesting facts about Chariklo's rings

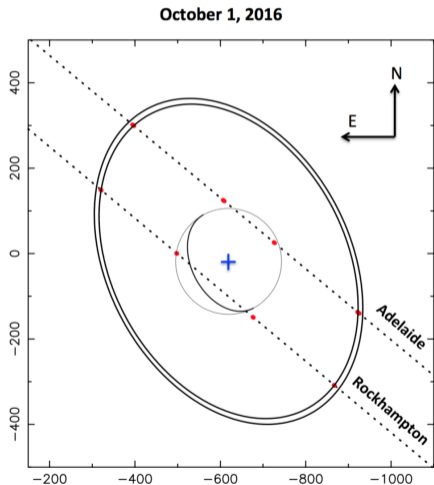
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→ possible evidence of rings eccentricity,
- C1R is sharp-edged (less than 1 km to enter the ring),
- For further investigations, we will be able to choose our scientific goals



gaia



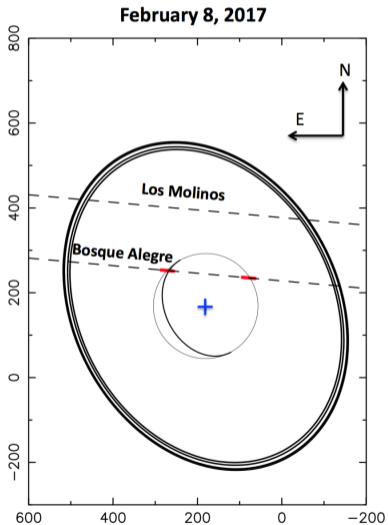
October 1, 2016



- First positive detection based on Gaia
→ SUCCESS!
- RA error : 9 mas; DEC error : 5 mas
- Third recorded multi-chord occultation
- Confirmation of the pole orientation determined with previous occultations



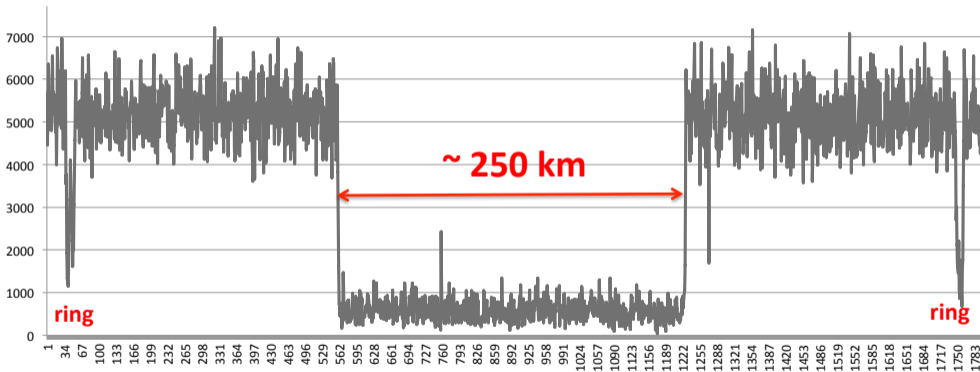
February 8, 2017



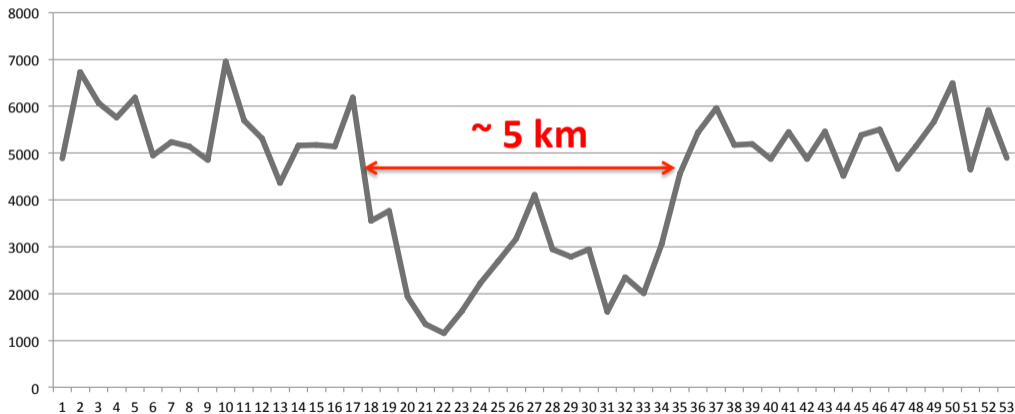
- Very low above horizon
- A single-chord detection of the main body
- But confirmation of our Gaia predictions :
→ Better than 5 mas in RA and DEC



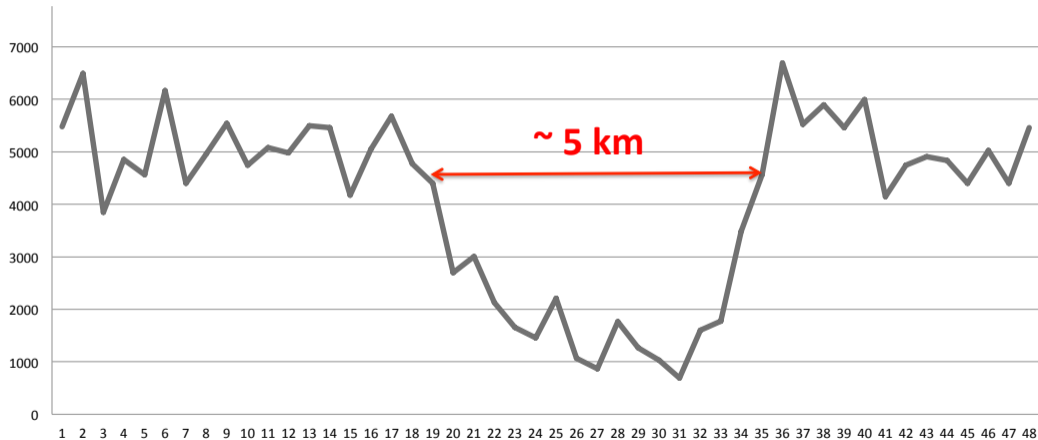
April 9, 2017



April 9, 2017 - Ingress main ring

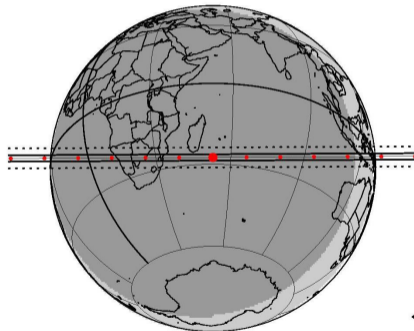


April 9, 2017 - Egress main ring



June 22, 2017

Chariklo: GaiaDR1 with proper motion, NIMA10 ephem. Offset (mas): 0.0 0.0



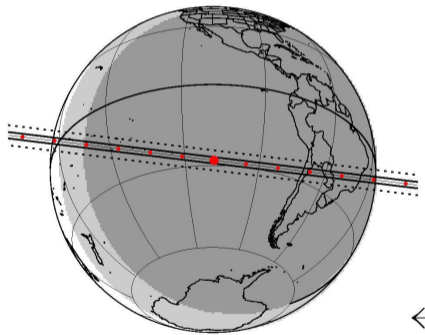
by: J.DESMARS+Ria_Group

d	m	year	h:m:s UT	ra_dec_J2000_candidate	C/A	P/A	vel	Delta	G*	K*	long
22	06	2017	21 18 48.	18 55 15.6526 -31 31 21.666	0.041	359.71	-22.00	14.66	14.2	-4.9	53.



July 23, 2017

Chariklo: GaiaDR1 with proper motion, NIMA10 ephem. Offset (mas): 0.0 0.0



by: J.DESMARS+Ria_Group

d	m	year	h:m:s UT	ra__dec__J2000_candidate	C/A	P/A	vel	Delta	G*	K*	long
23	07	2017	05 58 54.	18 48 09.2206 -31 26 32.461	0.034	6.95	-21.01	14.72	14.0	-4.9	-109.



Thank you for your attention !

