

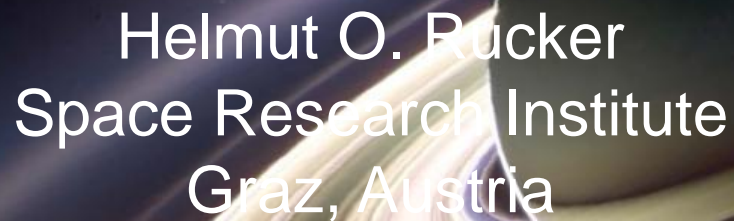
The background of the slide is a detailed image of Jupiter's atmosphere, showing the characteristic banded structure with various shades of orange, red, and white, and the Great Red Spot visible on the right side.

# Radiostrahlung der Riesenplaneten: Neue Phänomene

Helmut O. Rucker  
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Graz, Austria

Graz in Space 2012


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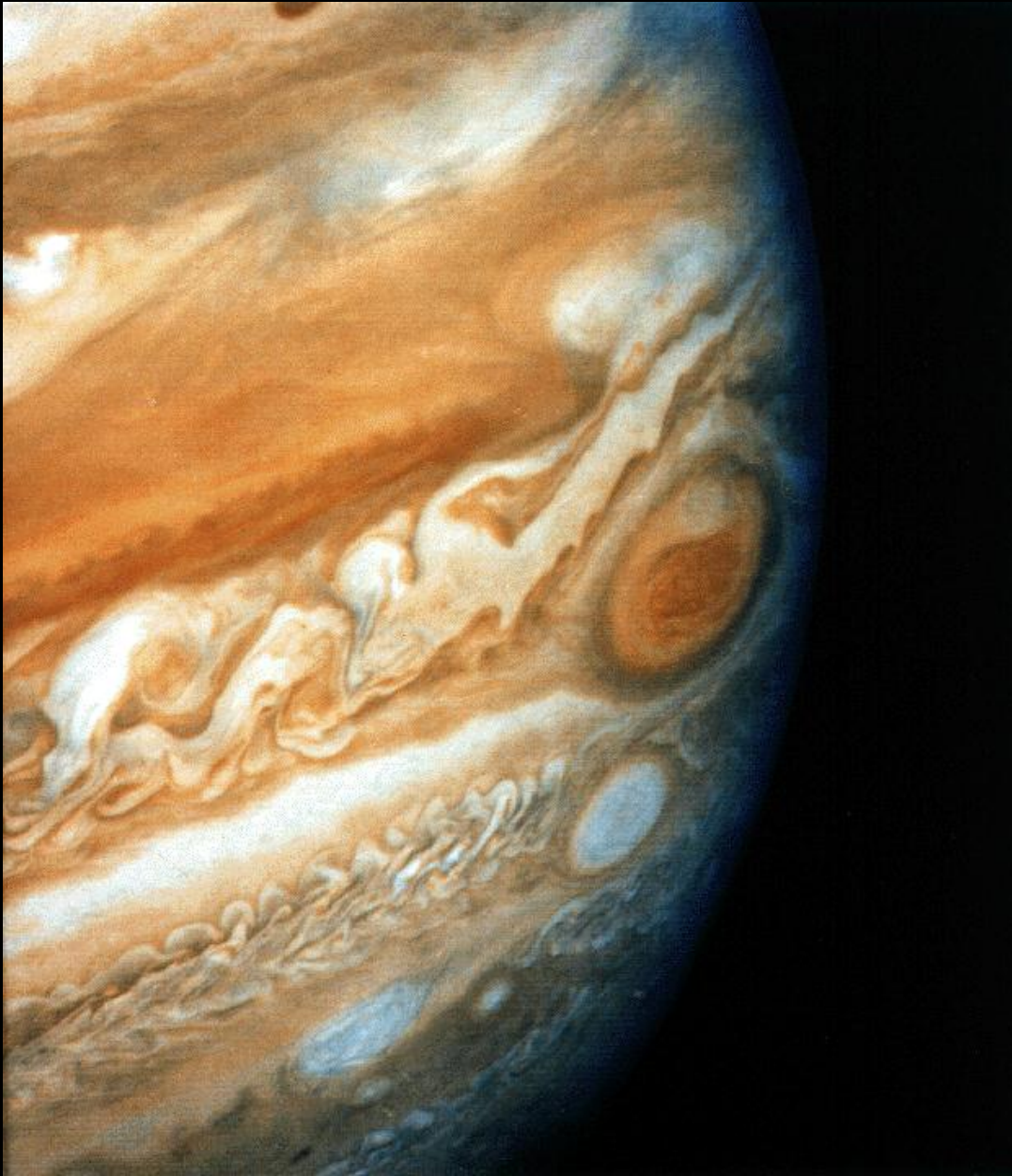
# Radiostrahlung der Riesenplaneten: Neue Phänomene

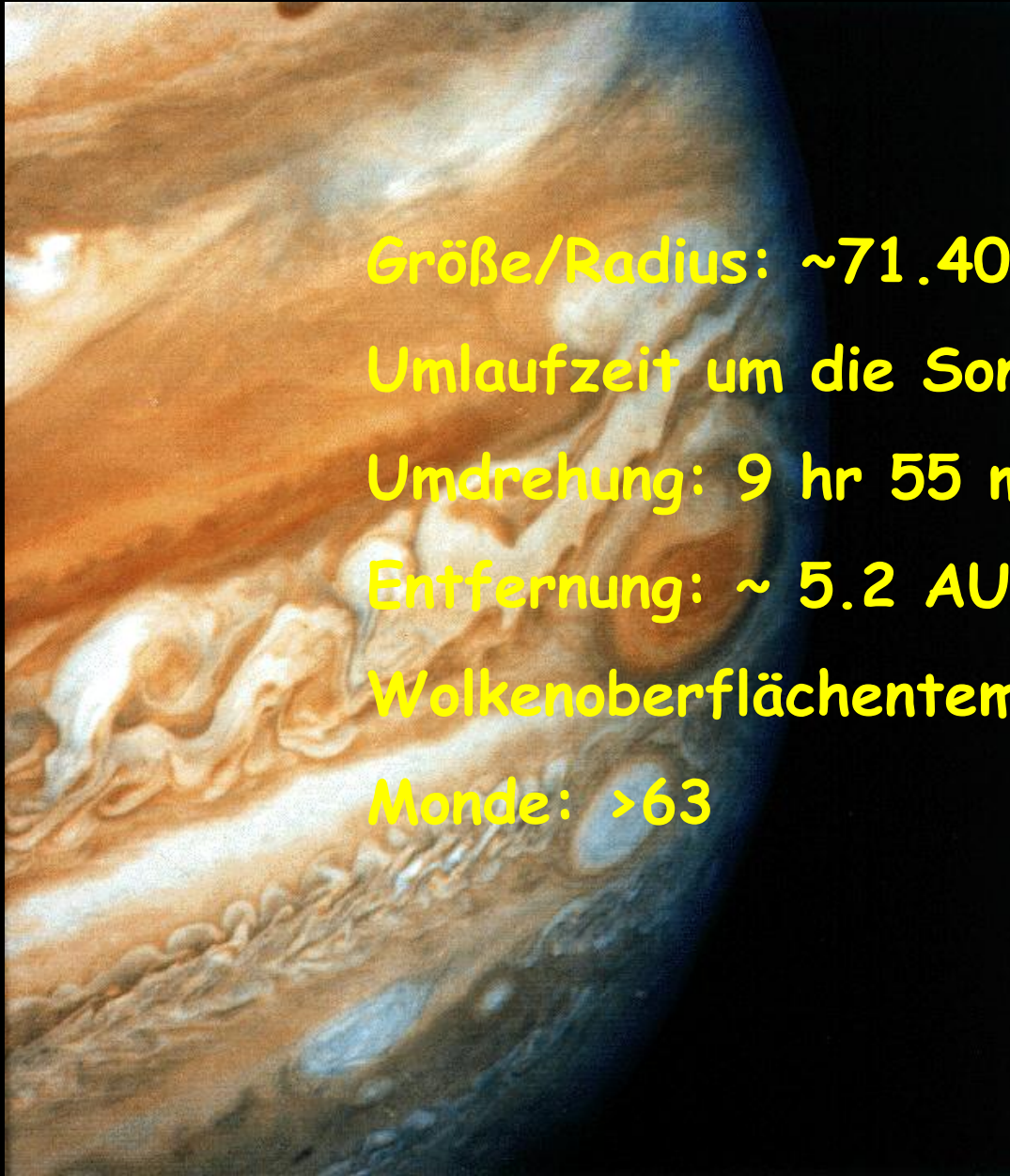


Helmut O. Rucker  
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Graz, Austria

Graz in Space 2012







Größe/Radius:  $\sim 71.400$  km (11  $R_E$ )

Umlaufzeit um die Sonne:  $\sim 12$  Jahre

Umdrehung: 9 hr 55 min 29.7 s

Entfernung:  $\sim 5.2$  AU

Wolkenoberflächentemperatur:  $-150^\circ\text{C}$

Monde:  $> 63$



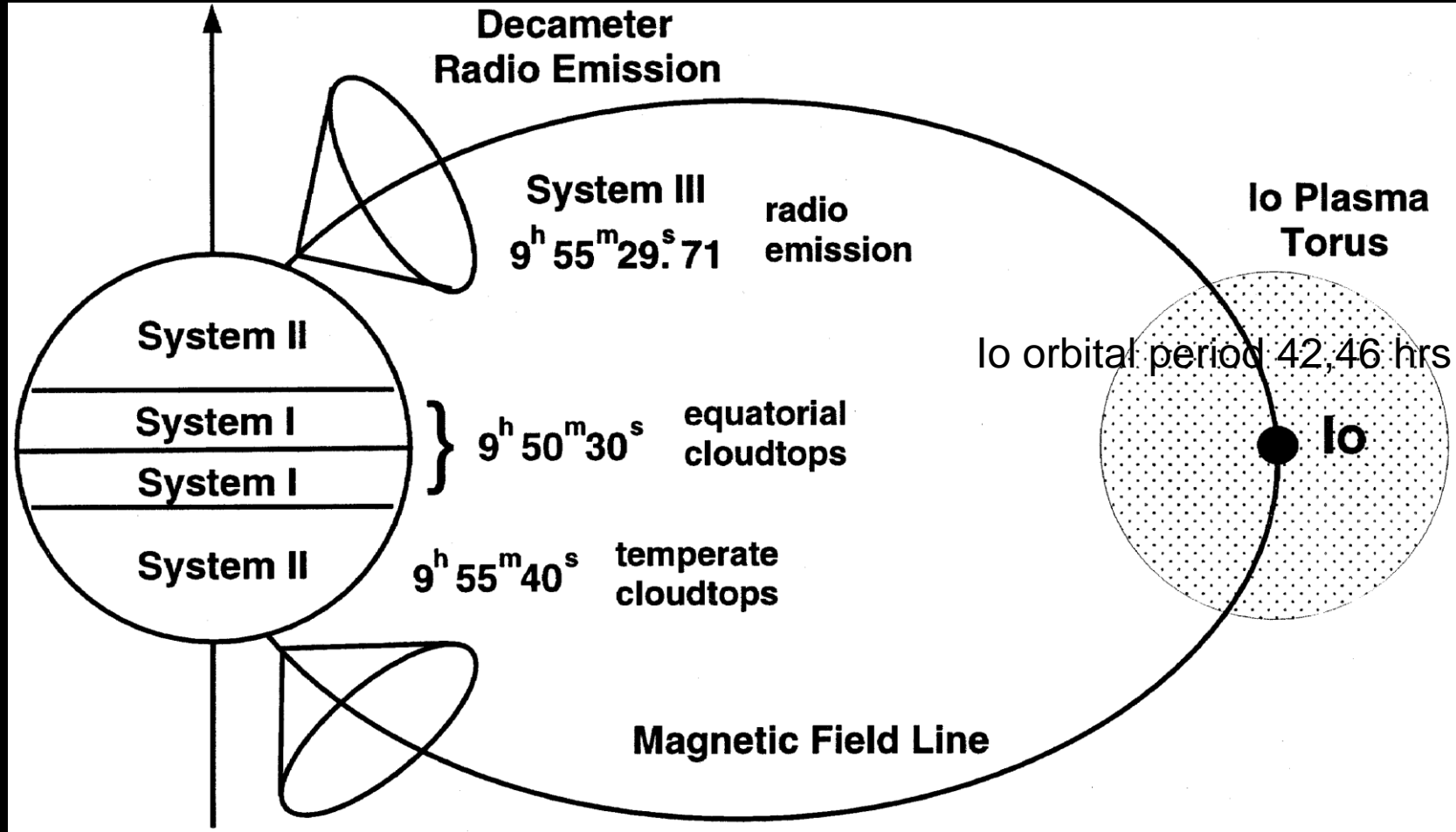
Größe/Radius:  $\sim 71.400$  km (11 Re)

Umlaufzeit um die Sonne:  $\sim 12$  Jahre

Umdrehung: 9 hr 55 min 29.7 s

**Rotationsperiode aus der Messung der  
Jupiter Radiostrahlung  
bestimmbar.**

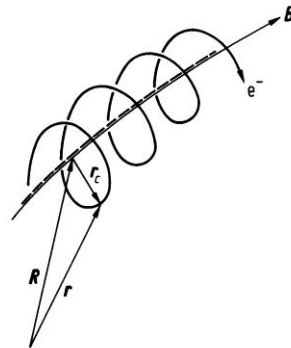




Modulation der Radiostrahlung durch a) die Jupiter-Rotation (~ 9,92 Std.)  
 b) den Jupitermond Io (~ 42,5 Std.)

Fundamentale Eigenschaft der planetaren Radiostrahlung:

Nicht-thermische Radio-Emission wird generiert als Emission von **gyrierenden Elektronen** in hohen Breiten magnetischer Planeten.

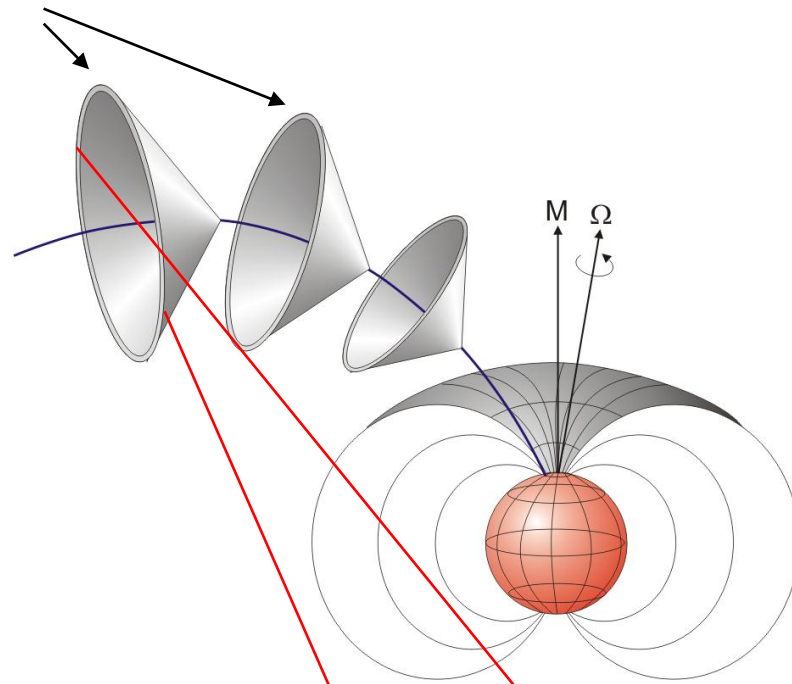


$$f \approx f_{ce}$$

$$f_{ce} = \frac{1}{2\pi} \frac{eB}{m_e}$$

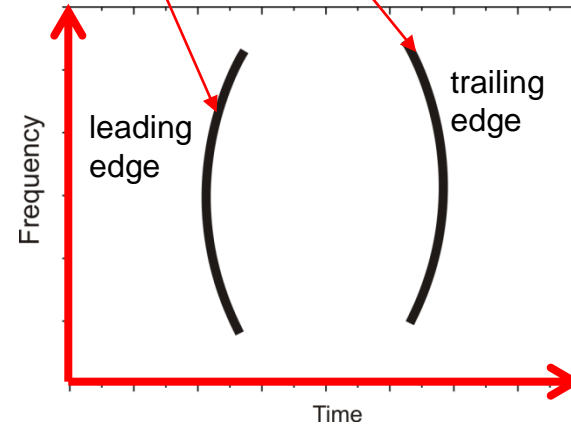


Hohlkegel bei unterschiedlichen Gyrofrequenzen

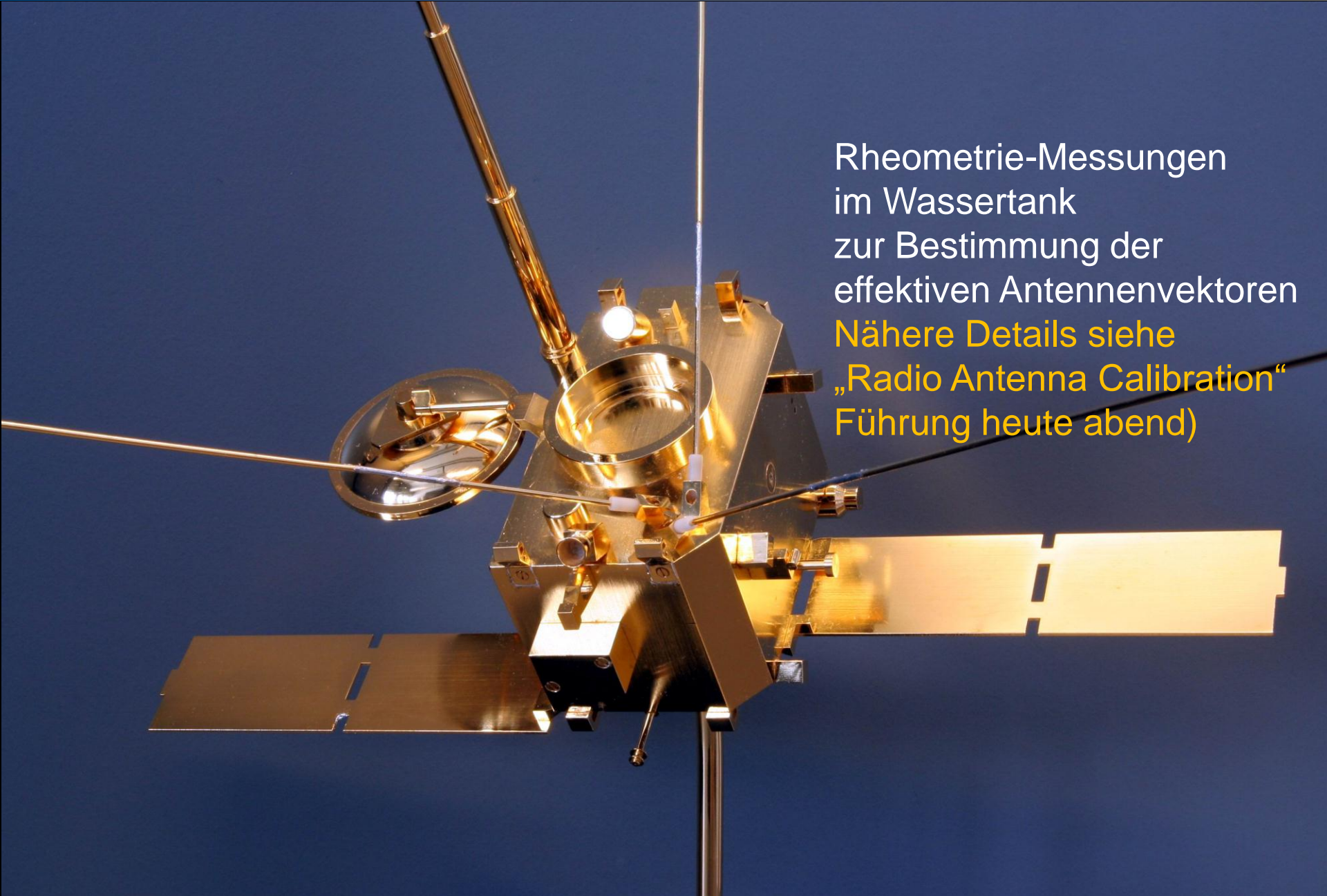


Hohlkegel verteilt entlang magnetischer Feldlinien

rotiert  
entweder mit Jupiter-Periode (9,92 hrs)  
(= non-Io emission)  
oder rotiert  
mit Io Flussröhre (42,5 hrs)  
(= Io emission)

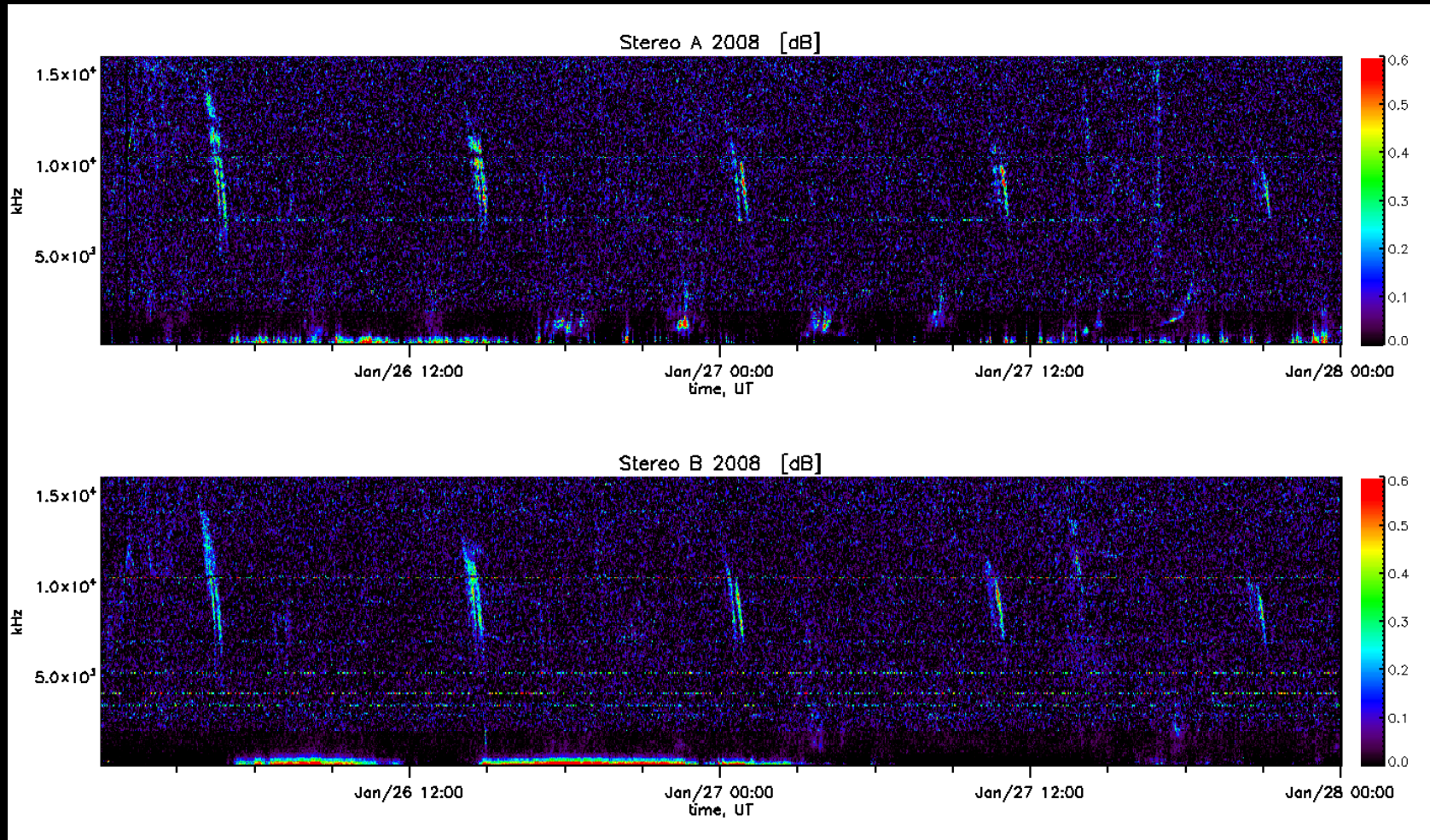


Adapted from  
Kaiser et al., 2000

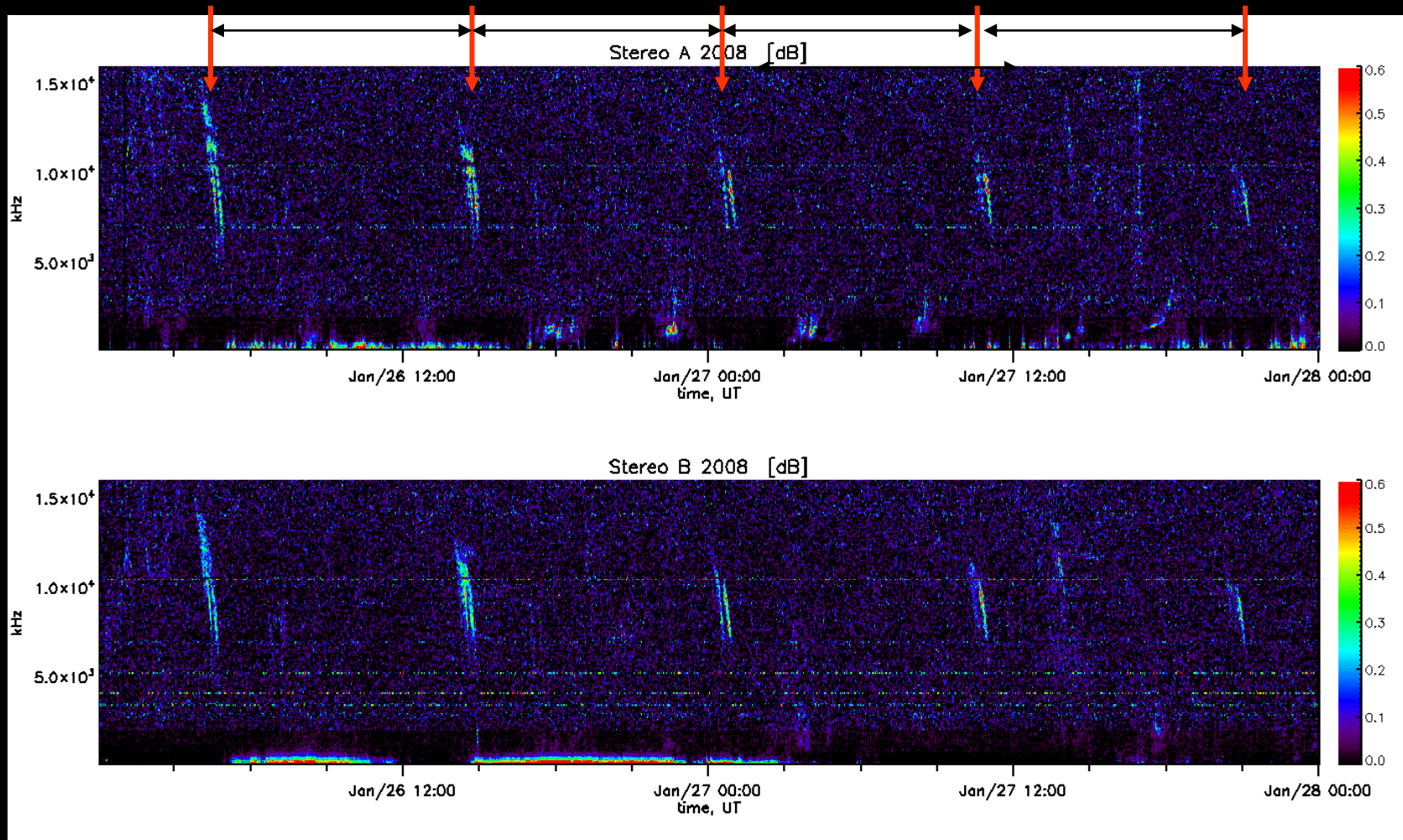


Rheometrie-Messungen  
im Wassertank  
zur Bestimmung der  
effektiven Antennenvektoren  
Nähere Details siehe  
„Radio Antenna Calibration“  
(Führung heute abend)







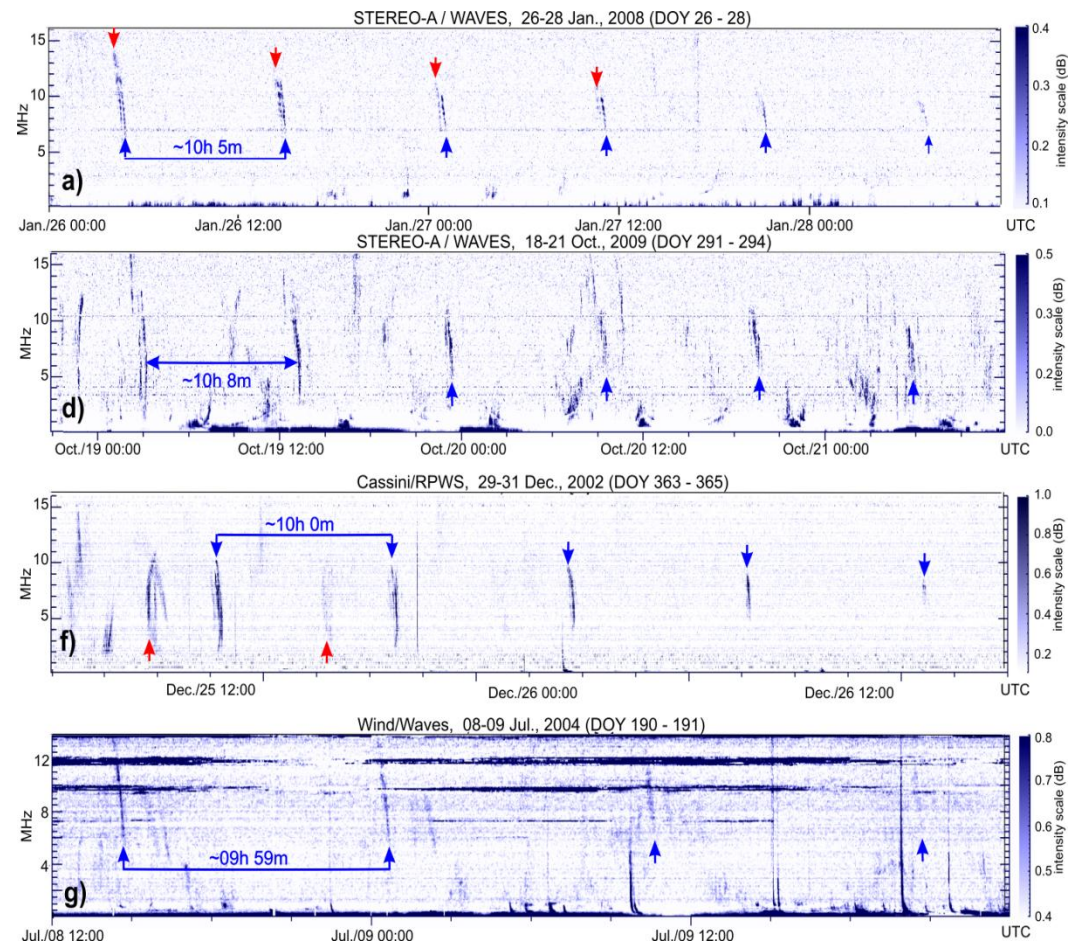


**FWF Projekt:  
Entdeckung einer neuen Radiokomponente von Jupiter (2010)**

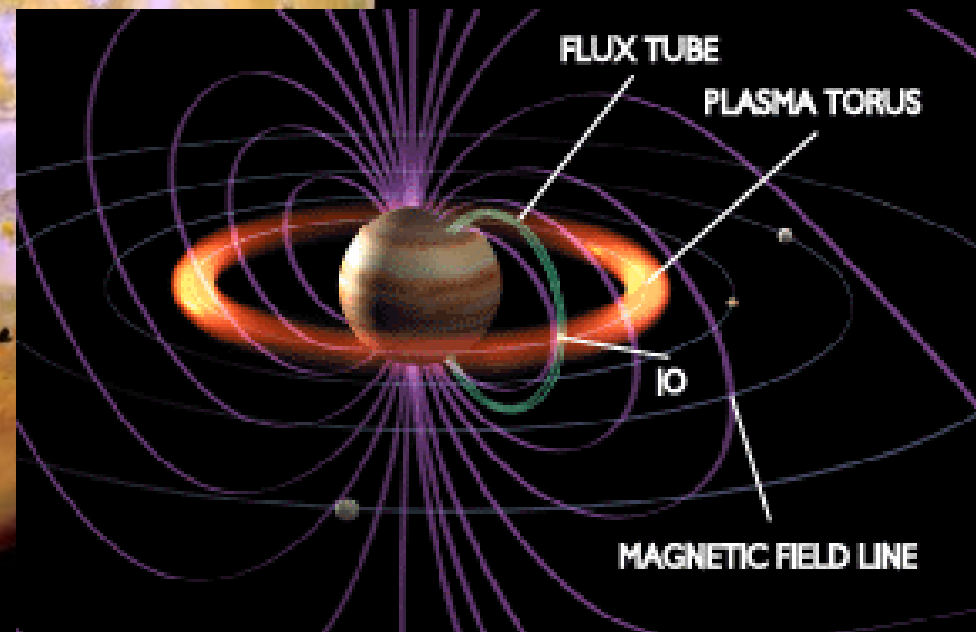
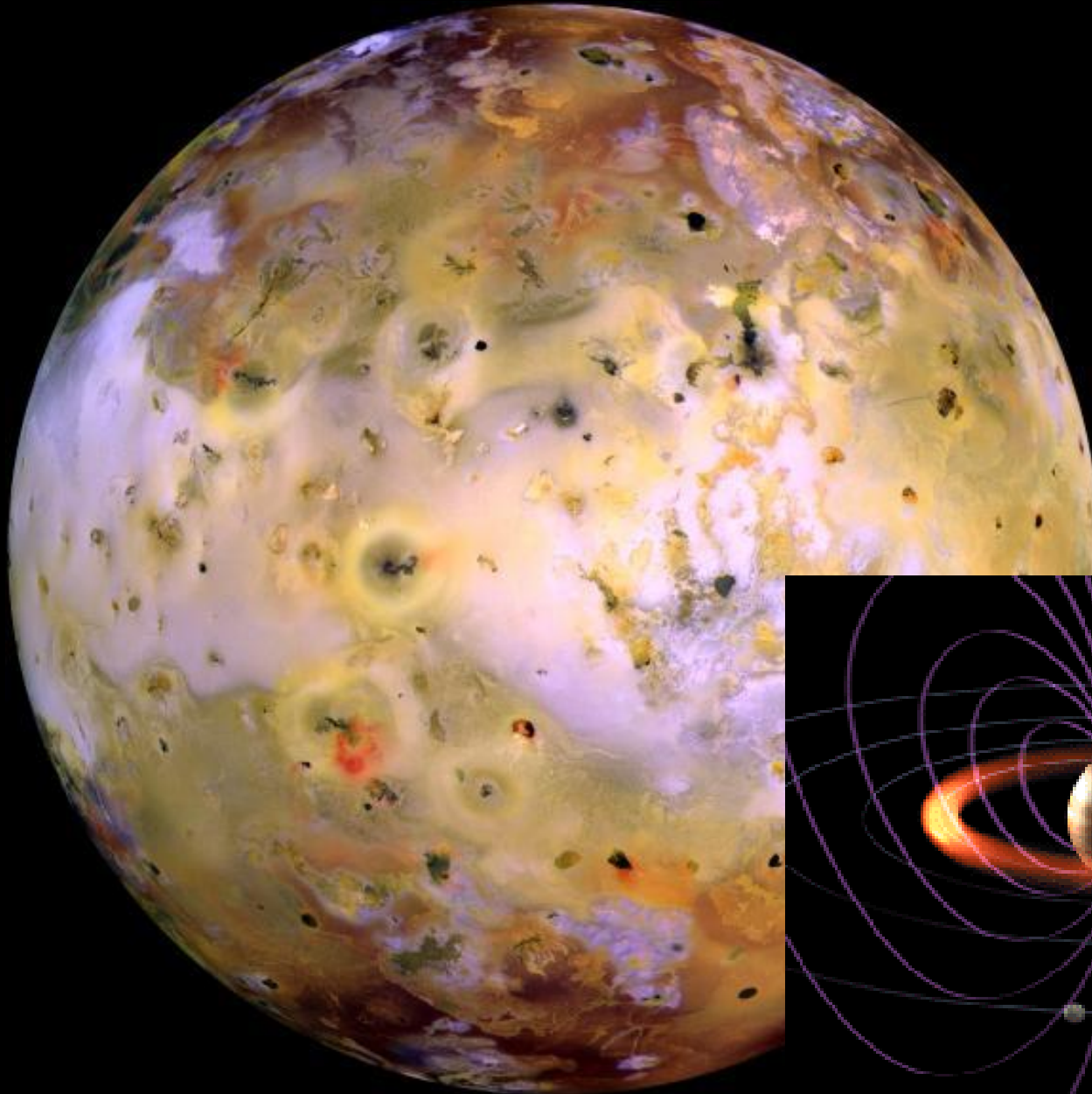


## Periodische Bursts von non-Io DAM:

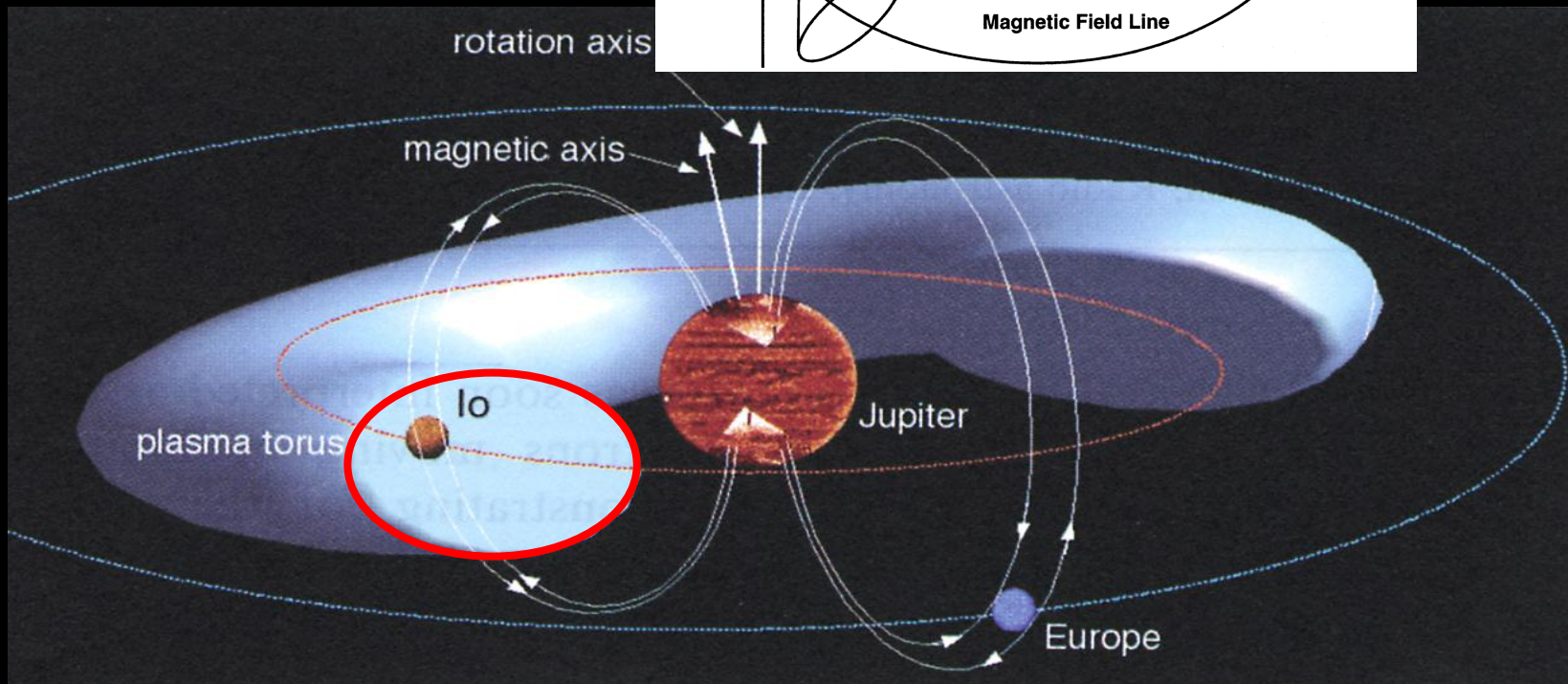
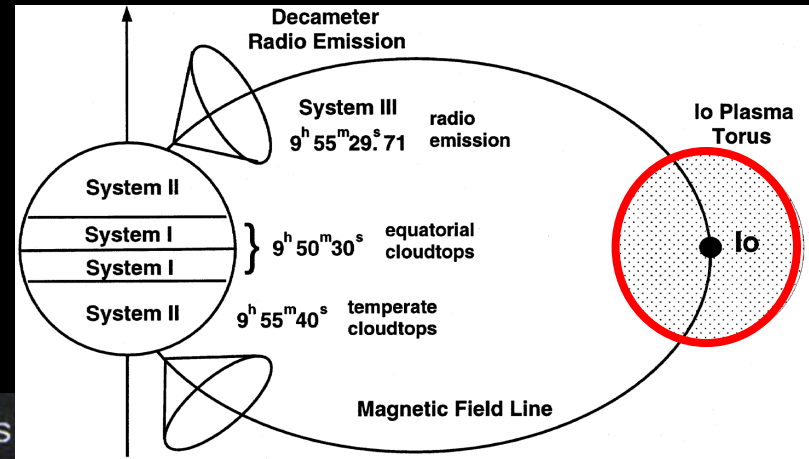
- Dekameter Frequenzbereich zwischen 5 und 12-16 MHz
- **Durchschnittl. Periode ~1.5% länger als Jupiter Rotationsrate (System III, 9.925 h)**
- Periodische Bursts sind non-Io Komponente von DAM und ihre Quellen **sub-corotieren** mit Jupiter
- Aktive Längen: 300°-60° CML(III).
- Keine Korrelation mit Io Position oder anderen Jupitermonden

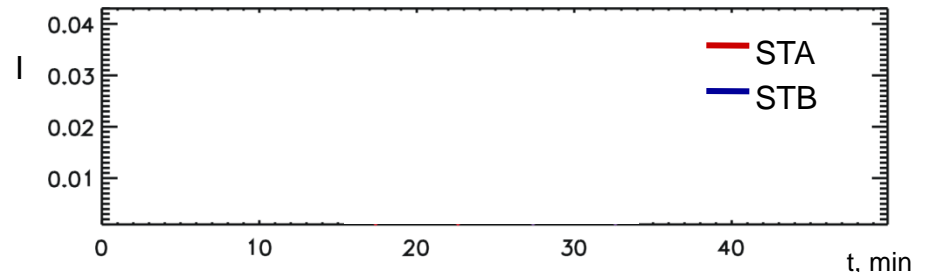
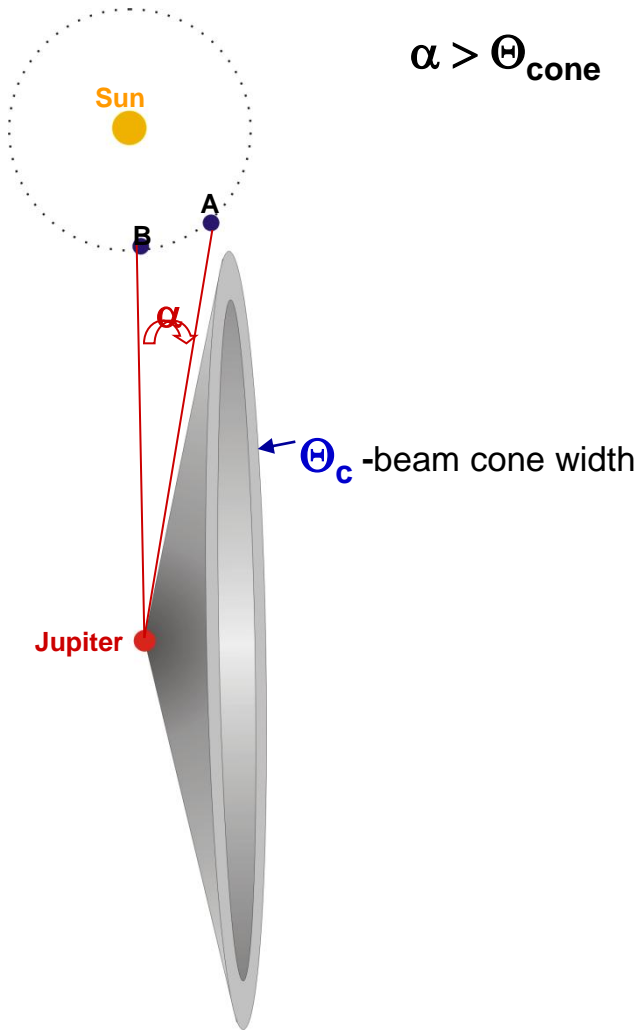


Panchenko, M., H.O. Rucker, M.L. Kaiser, O.C. St. Cyr, J.-L. Bougeret, K. Goetz, S.D. Bale: New periodicity in Jovian decametric radio emission, *Geophys. Res. Lett.*, **37**, L05106, doi:10.1029/2010GL042488, 2010



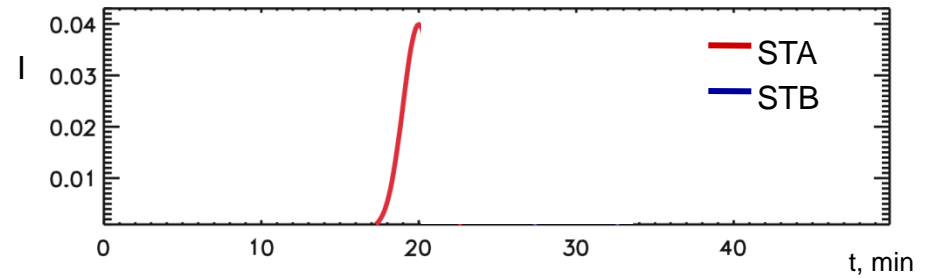
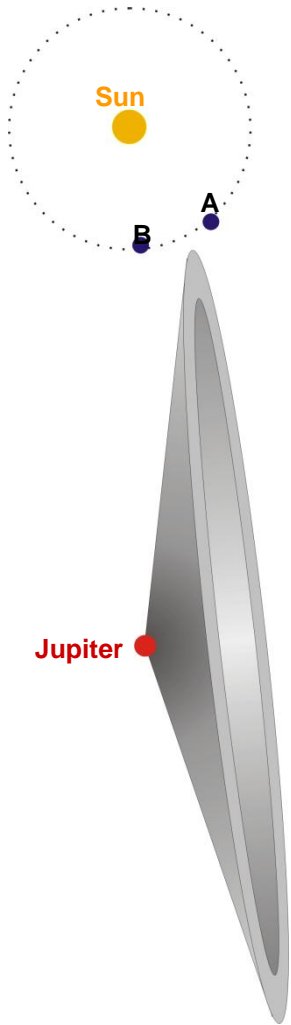




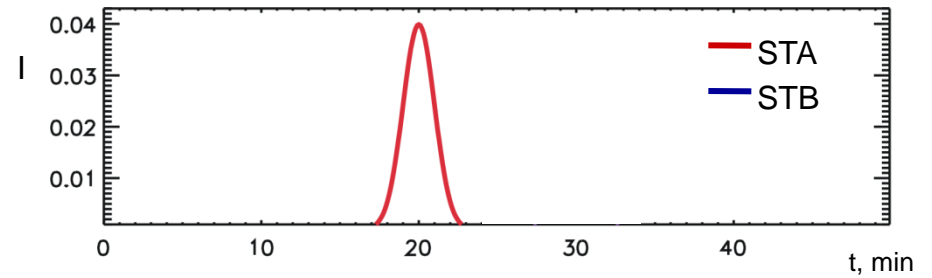
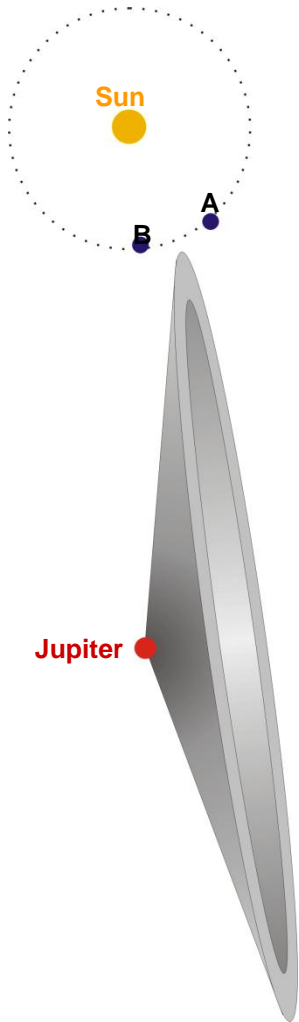


Schematic illustration of stereoscopic observation of the Jovian „arc-like“ emission by STEREO-A and -B spacecraft

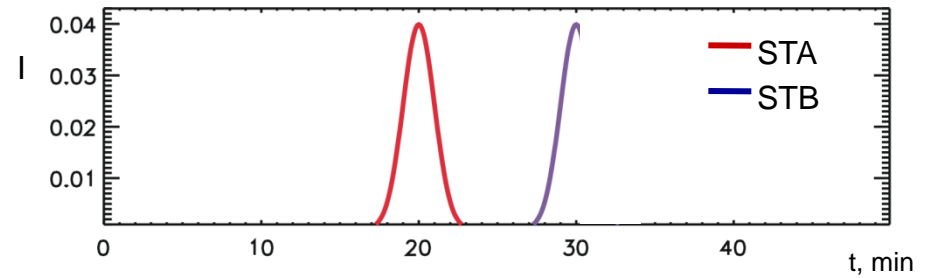
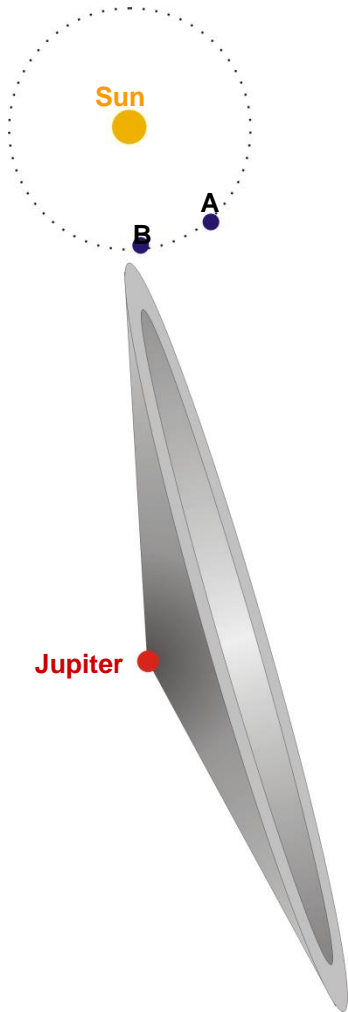




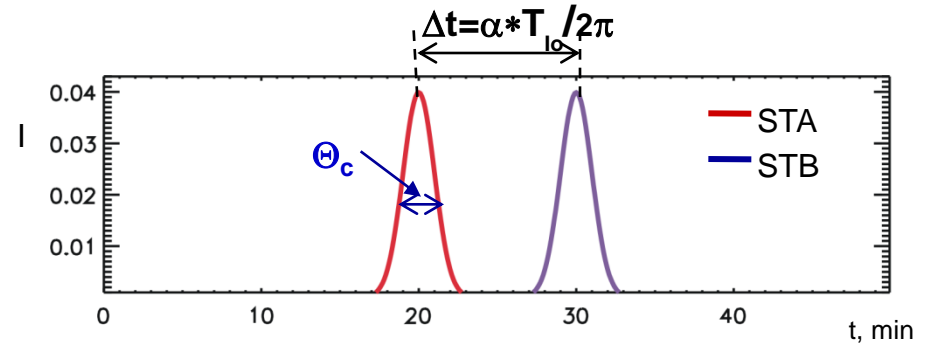
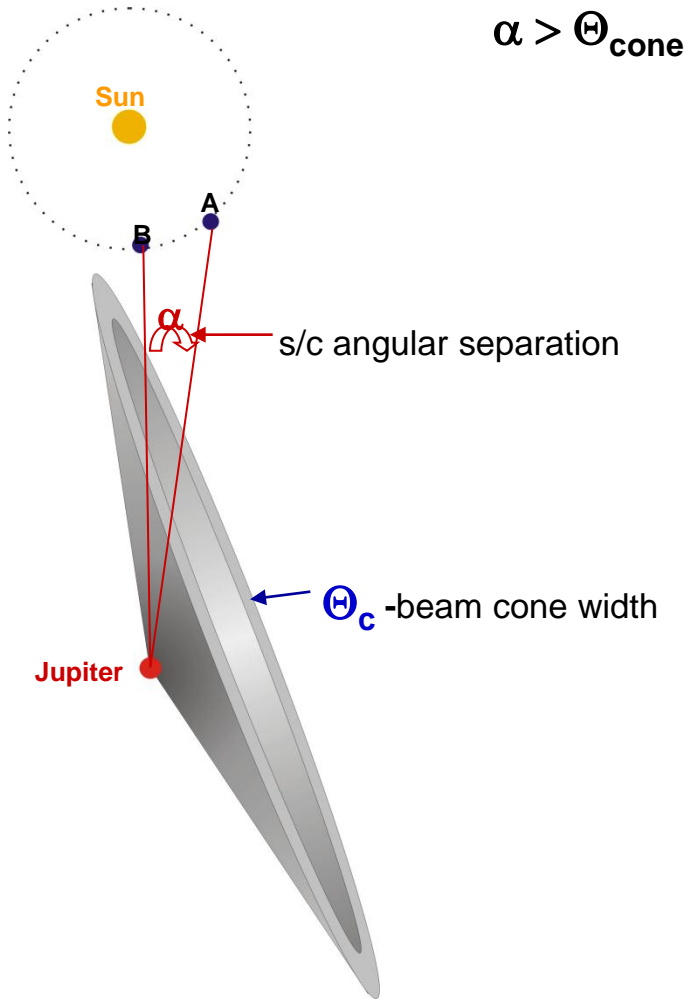
Schematic illustration of stereoscopic observation of the Jovian „arc-like“ emission by STEREO-A and -B spacecraft



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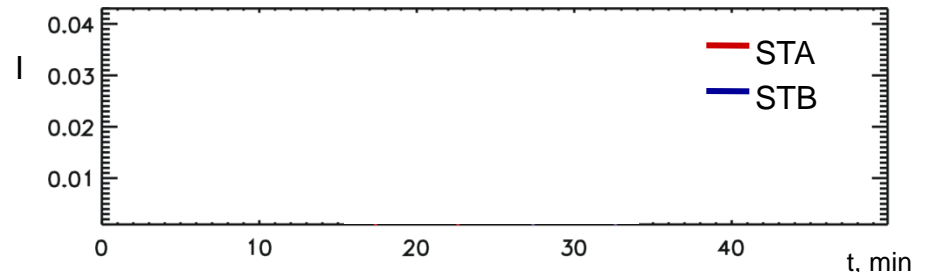
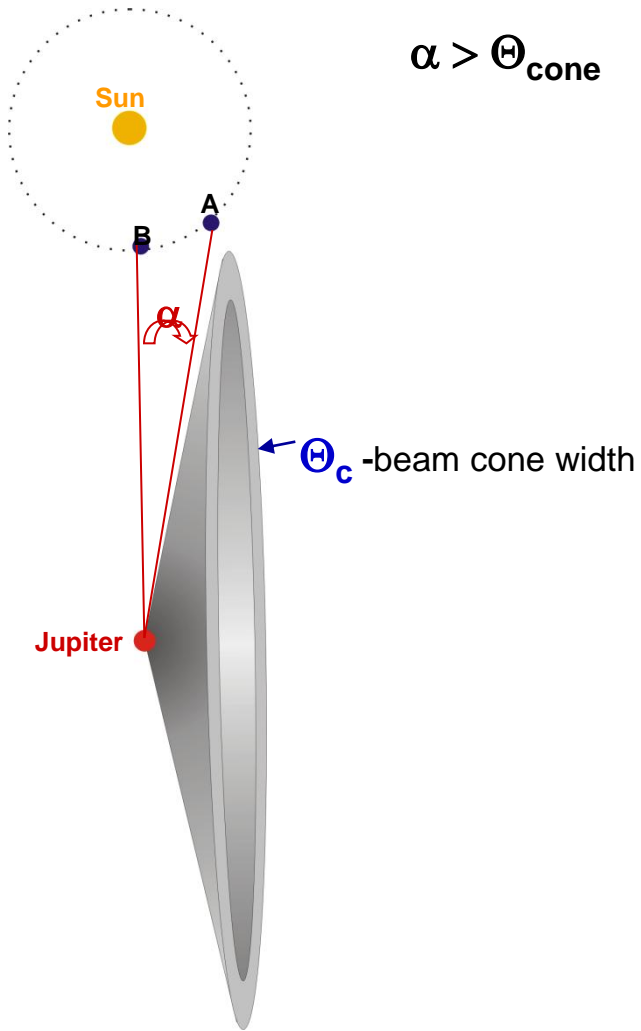


Schematic illustration of stereoscopic observation of the Jovian „arc-like“ emission by STEREO-A and -B spacecraft

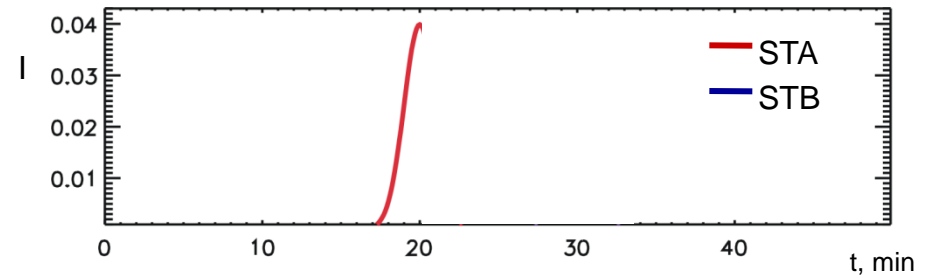
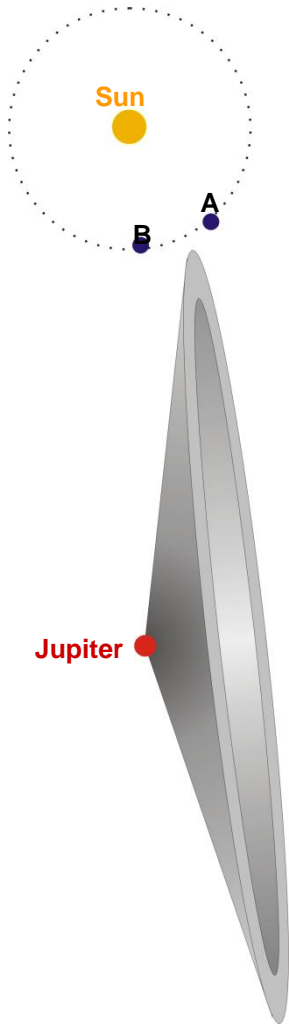


Schematic illustration of stereoscopic observation of the Jovian „arc-like“ emission by STEREO-A and -B spacecraft

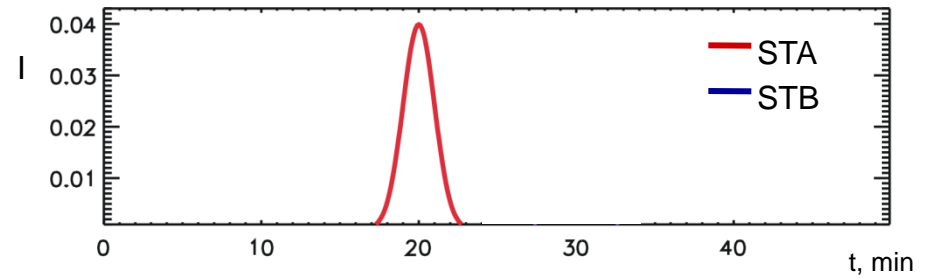
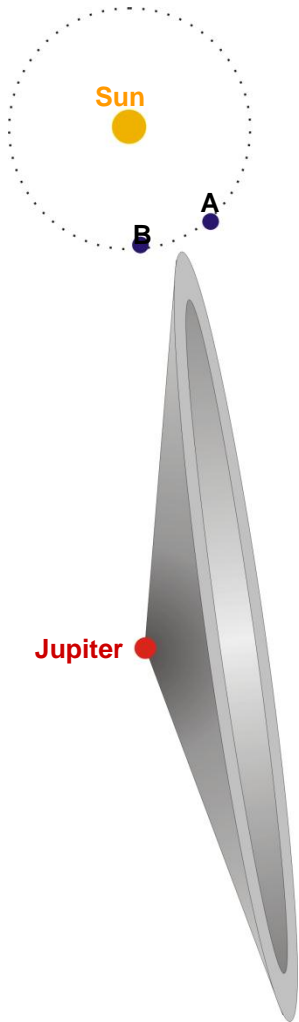




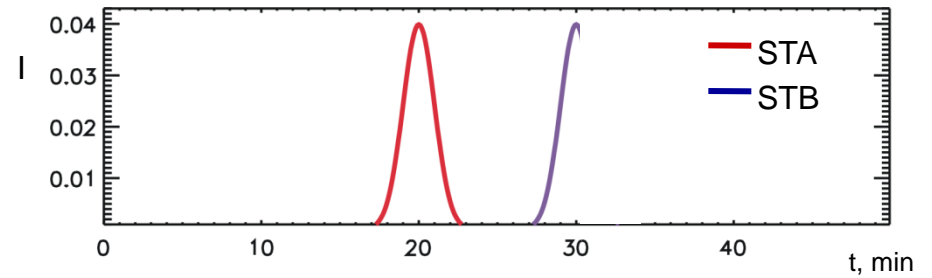
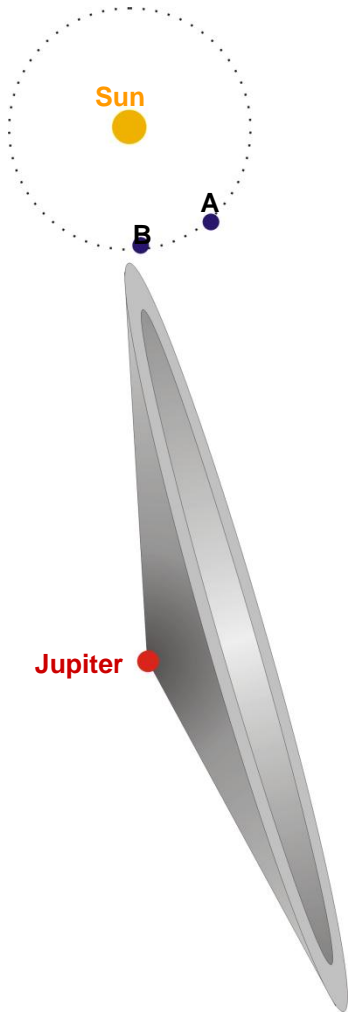
Schematic illustration of stereoscopic observation of the Jovian „arc-like“ emission by STEREO-A and -B spacecraft



Schematic illustration of stereoscopic observation of the Jovian „arc-like“ emission by STEREO-A and -B spacecraft

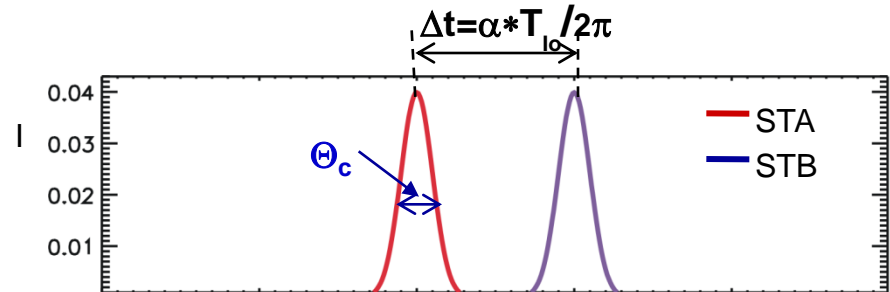
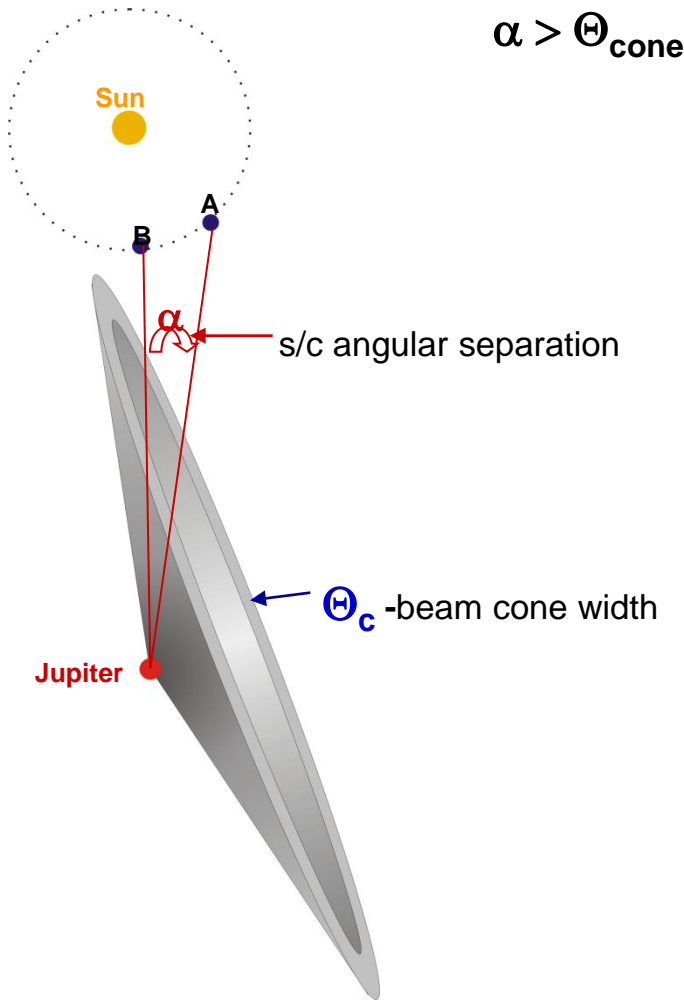


Schematic illustration of stereoscopic observation of the Jovian „arc-like“ emission by STEREO-A and -B spacecraft



Schematic illustration of stereoscopic observation of the Jovian „arc-like“ emission by STEREO-A and -B spacecraft





Emission cone width:

lo-C:  $1.07^\circ - 1.12^\circ$  (22 episodes)

lo-D:  $0.96^\circ - 1.08^\circ$  (24 episodes)

non-lo:  $1.11^\circ - 1.13^\circ$  (21 episodes)

(Panchenko et al., 2010)

(Zörweg, Diploma thesis, 2011)

Schematic illustration of stereoscopic observation of the Jovian „arc-like“ emission by STEREO-A and -B spacecraft

# Uranus

Voyager 2 Vorbeiflug Jan 24, 1986 (CLA 107,000 km)

Distanz zur Sonne:

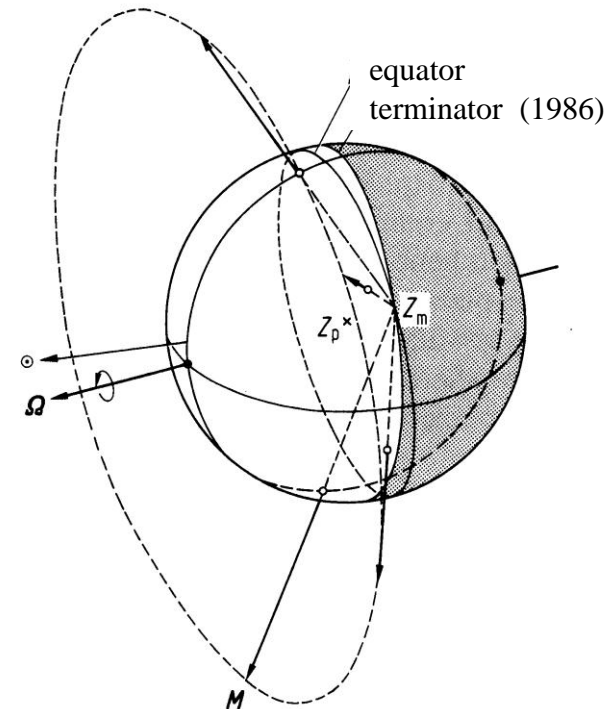
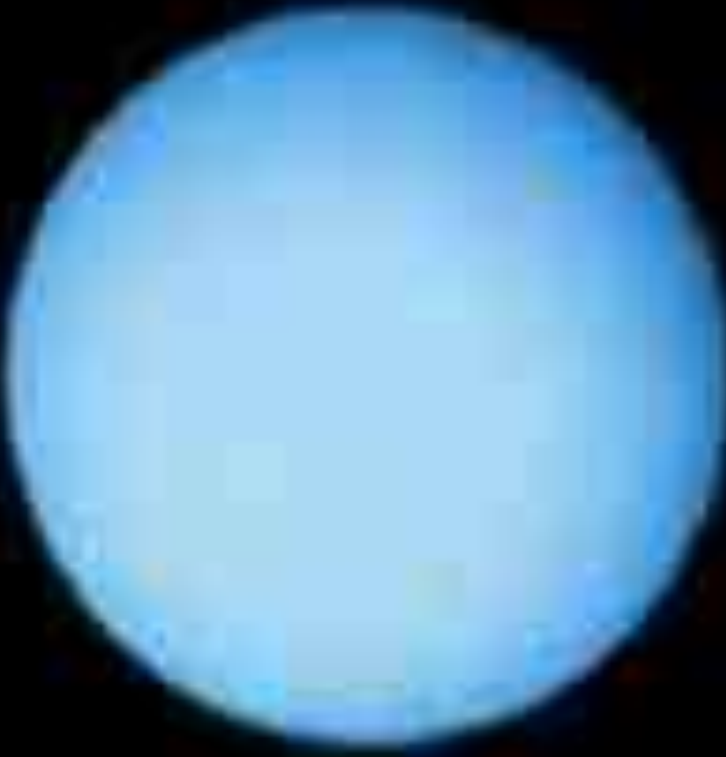
19.2 AU

Orbitalperiode:

84.011 Jahre

Äquator. Radius:

25,550 km (4.007 Re)

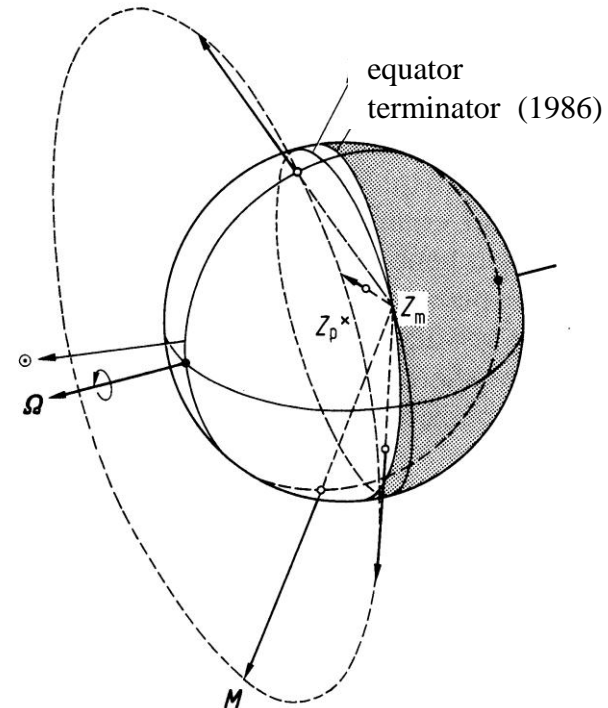
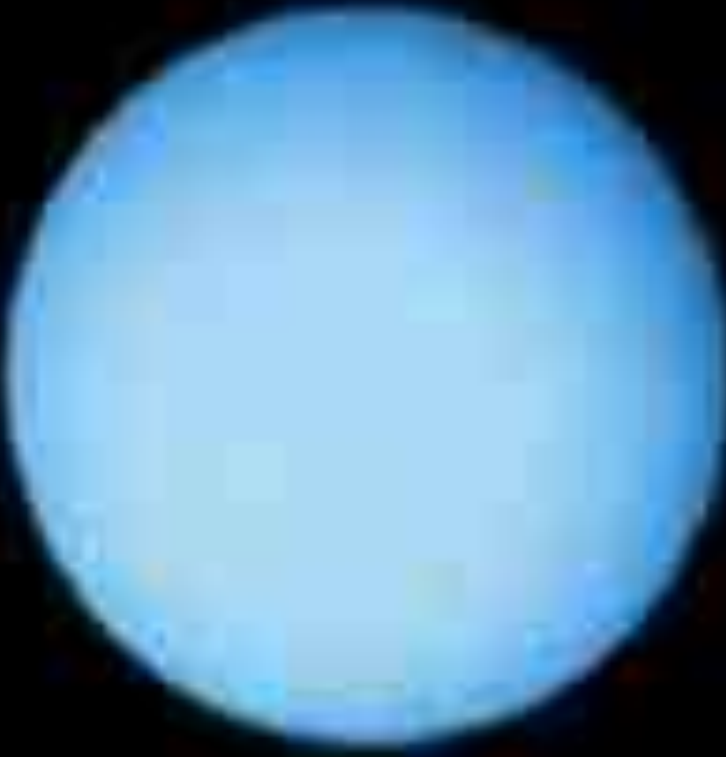


# Uranus

Voyager 2 Vorbeiflug Jan 24, 1986 (CLA 107,000 km)

Rotationsperiode:

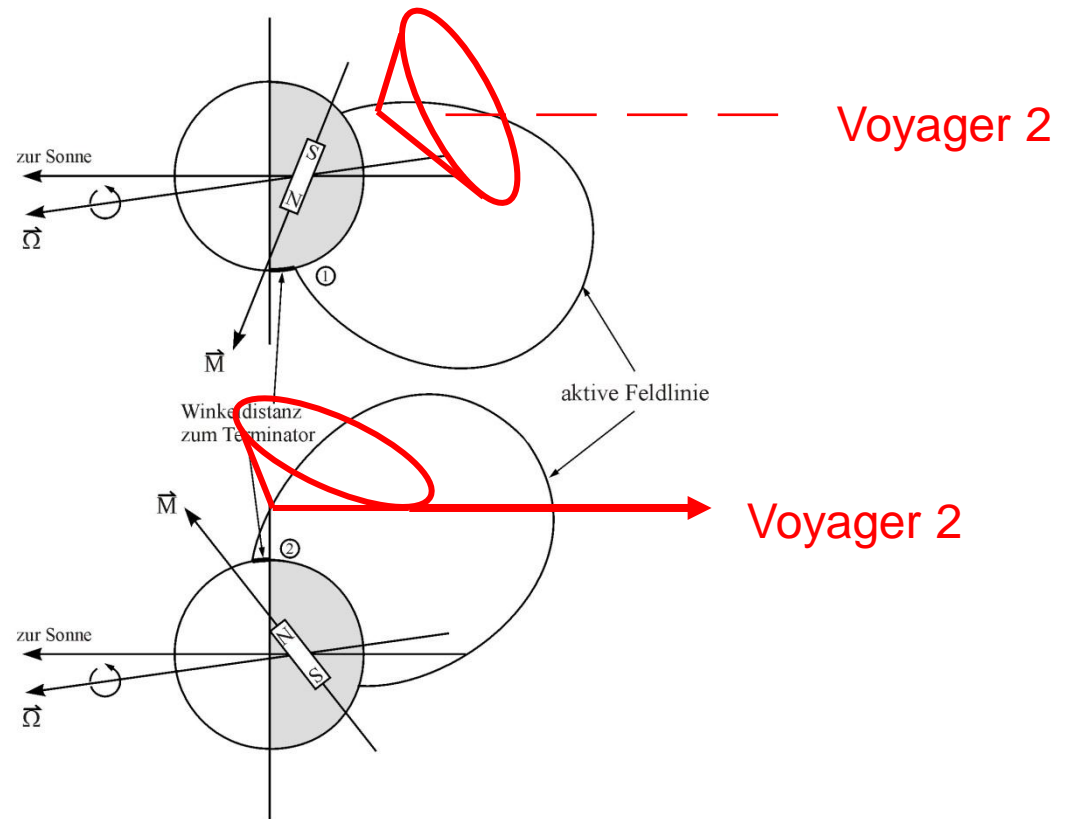
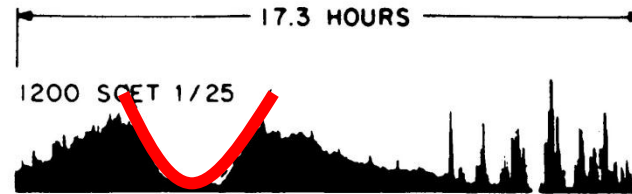
17.24 +/- 0.01 hrs



**„Bite out“:**

Determination of Uranus **rotational period**: ~17,3 hrs

Manifestation of **„hollow cone“**-theory of planetary radio emission





dzt. 778 Exoplaneten bekannt  
(29.8.2012)



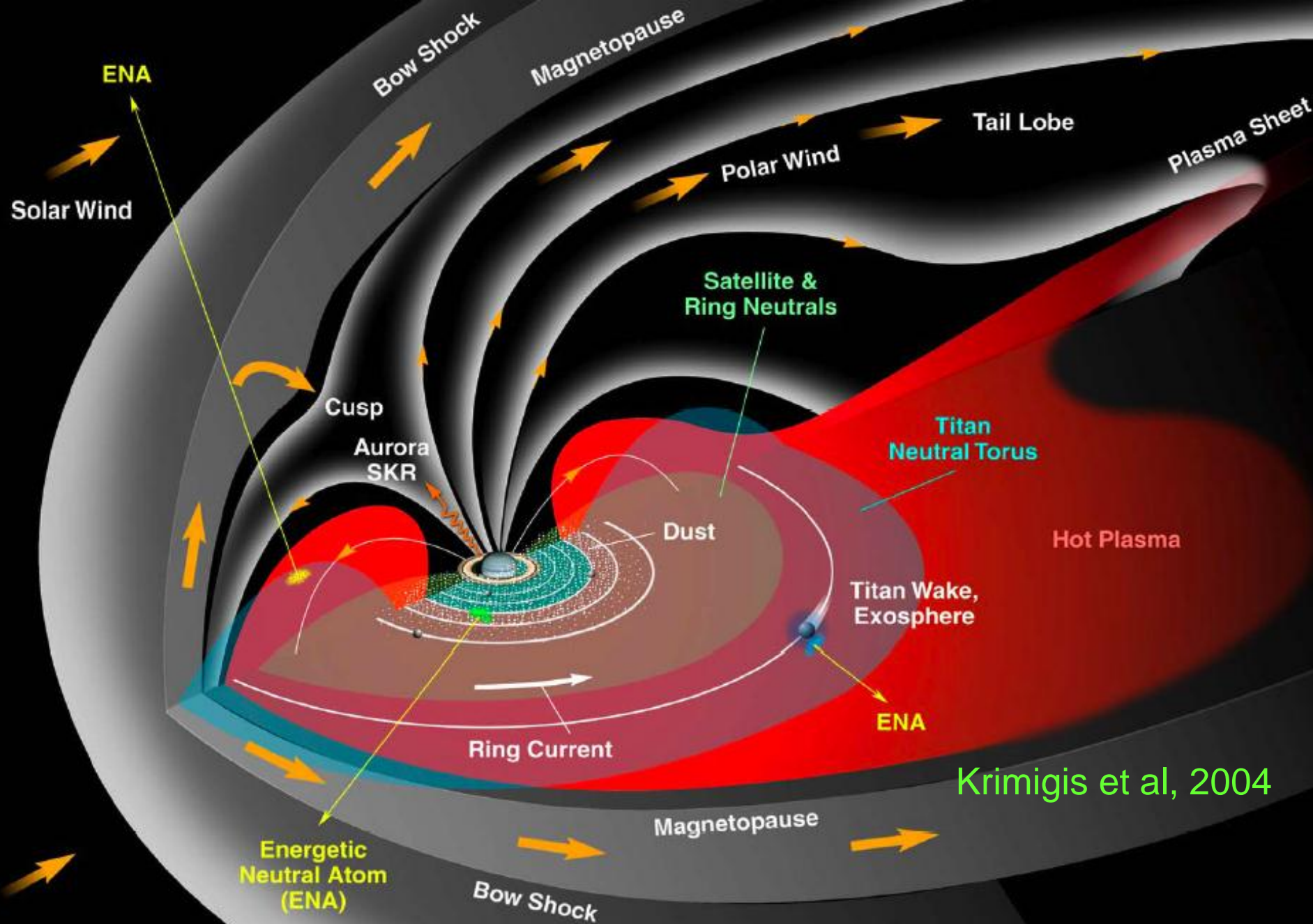


Forschungsarbeiten auf dem Gebiet der  
exoplanetaren Wechselwirkung zwischen  
Zentralstern und „Hot Jupiters“ :  
Radiostrahlung von exoplanetaren Systemen

# Saturn

The background of the slide features three Saturns with their rings, arranged in a diagonal line from the bottom-left to the top-right. Each Saturn is shown from a slightly different perspective, highlighting the structure of its rings and the banded atmosphere. The rings are depicted as multiple overlapping grey and white bands.

Durchschnittl. Distanz zur Sonne: 9.58 AU  
Orbitalperiode: 29.5 Jahre  
Äquator. Radius: 60,270 km (9.45 Re)



Krimigis et al, 2004

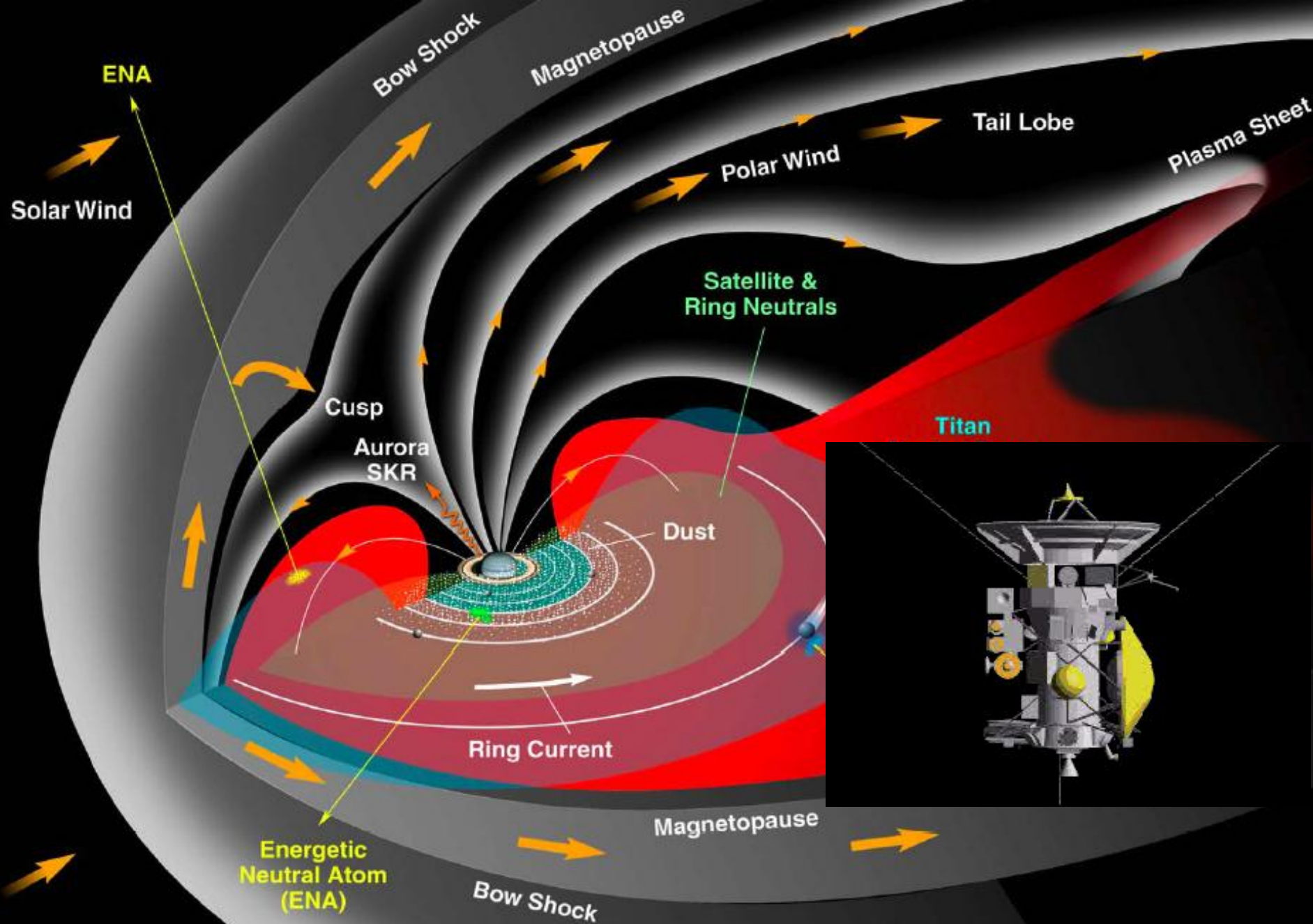
# Saturn's Magnetosphere

Solar Wind

97-8422

Courtesy Krupp





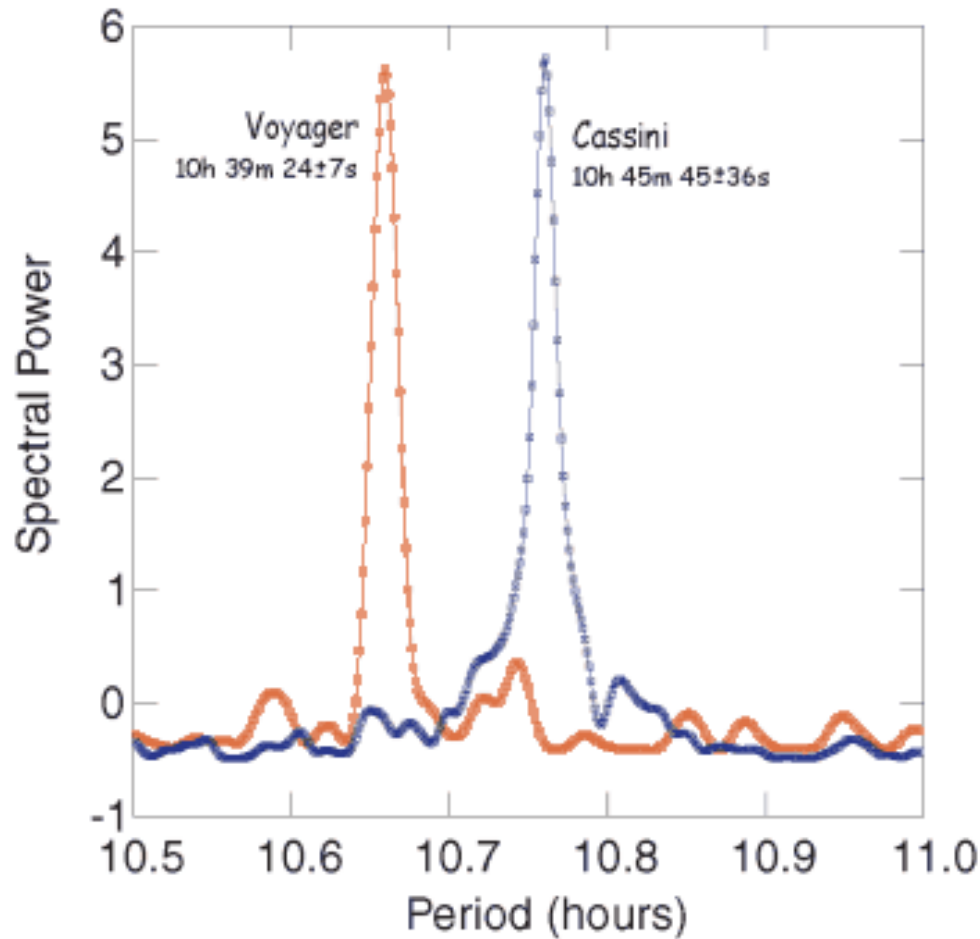
# Saturn's Magnetosphere

Solar Wind

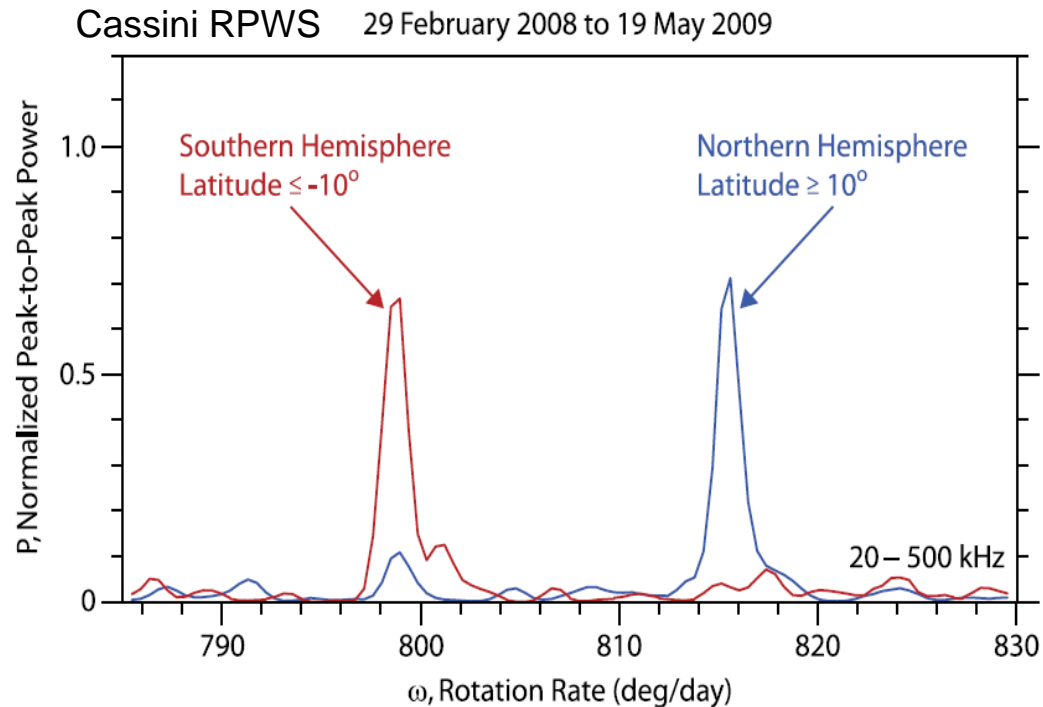
97-8422

Courtesy Krupp

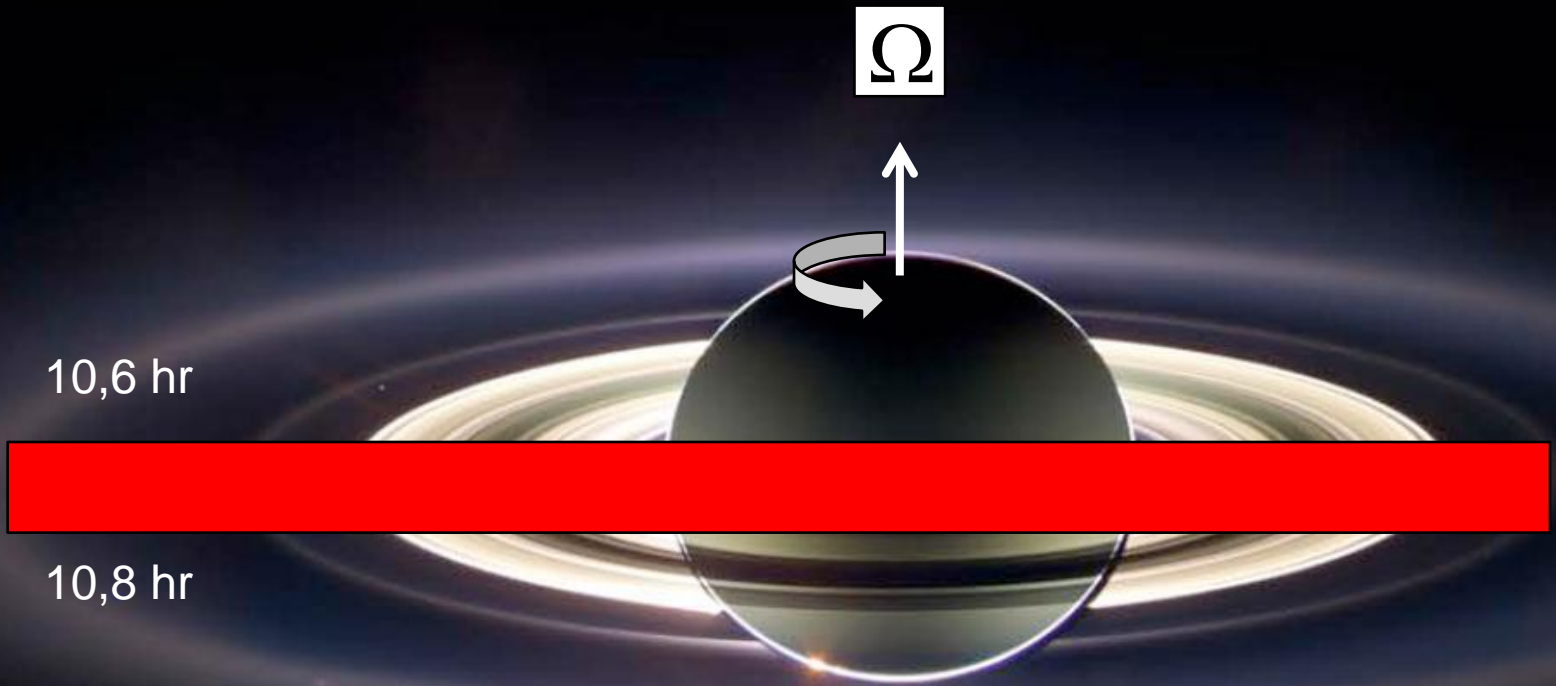
Modulation von Saturn Kilometric Radiation (SKR)  
durch planetare Rotation







**Figure 3.** Rotational modulation spectra averaged over the interval from 29 Feb. 2008 to 19 May 2009 where the spacecraft had a unusually long series of excursions to high northerly and high southerly latitudes.



A-D09-064-45

