

# On the origin of the 2-3 minutes quasi-periodicity in the Jovian magnetosphere

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## Abstract

Several kinds of periodicities have been observed at Jupiter since the first probes fly-by. However, previous investigations mainly focused on the longer timescales, such as the 40 minutes (QP40) or the 2-3 days quasi-periodicity. Here we describe the recent finding of the 2-3 minutes quasi-periodic occurrence of UV flares in the active region of the polar aurora. These observations are then compared to other measurements of such quasi-periodic behaviors in electron and magnetic field data and their probably common origin is discussed.

## 1. Quasi-periodic auroral polar flares

Flares are short but dramatic enhancements of brightness of the Jovian aurora localized in the so-called active region. The Hubble Space Telescope/STIS campaign from summer 2009 used for the first time the high time-resolution time-tag mode continuously for ~45 minutes[1]. This strategy allows us to find that the flares were appearing regularly, with a recurrence time between 2 and 3 minutes. Based on a recent magnetic mapping model [3], we show that their magnetospheric counterpart lie close to the front or duskside magnetopause.

## 2. Mapping the relativistic electron bursts

We find that the short-timescale (144 seconds) relativistic electron bursts observed by Ulysses/HET are much more frequent than previously reported [2]. Moreover, we map these bursts along magnetic field lines and we show that their footprint's locations are

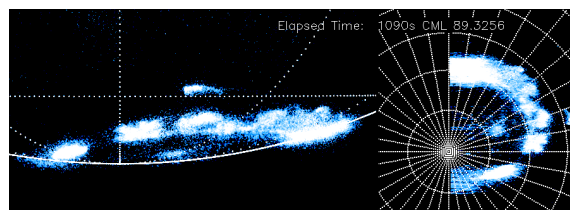


Figure 1: (left panel) Southern hemisphere FUV aurora as observed by the Hubble Space Telescope STIS instrument on 11 September 2009. The flare is the brightness enhancement located inside of the main emission. In this sequences, it re-appears every 2-3 minutes. Note that the spot located equatorward of the main emission is the Io footprint. (right panel) Polar projection of the same image.

compatible with the auroral flares, suggesting that they might have a common origin.

## 3. Flux Transfer Events and Mirror Modes

Walker and Russell [4] identified some flux transfer event signatures in the Pioneers and Voyagers magnetic field data and showed that their recurrence period was also between 1 and 4 minutes. We show here that such a period is also common in the mirror mode structures in the magnetosheath.

## 4. Summary and Conclusions

The similar recurrence time and location of the various observations reported here suggest that these quasi-periodic signatures originate from the same process. One possibility is that these relatively short periods could be related to pulsed reconnection at the day-side magnetopause, by analogy with similar phenomena observed at Earth.

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