

On-the-Fly FFT Status

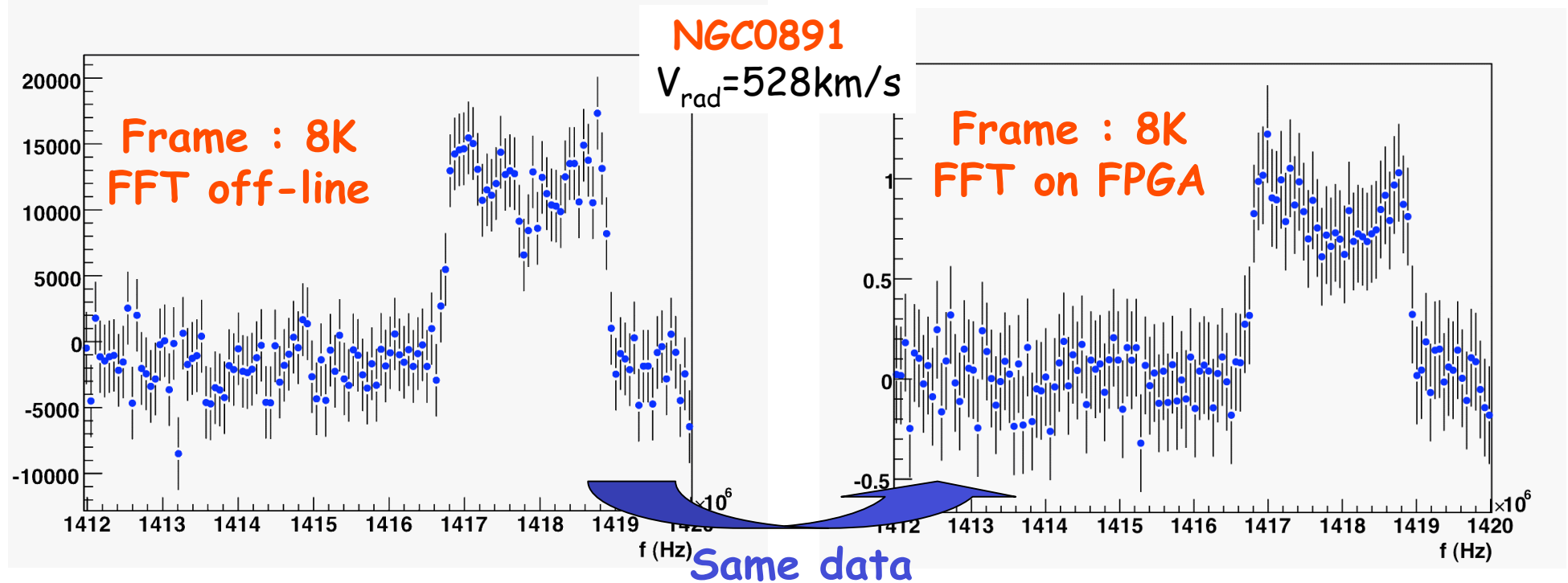
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Outline

- Status
- Open issues
- New developments

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On-the-Fly FFT on FPGA



Tests of the FFT:

- 2 channels (raw data) 2 channels (on-the-fly FFT)
- Frame : 8k samples per channel
- Resolution: (60kHz)
- Comparison for the same data (FFT off-line - FFT on FPGA)
- **First results in April at Nançay and later at Pittsburgh**

Open issues for the FFT on FPGA

Transmission of Data:

- Problems of synchronization between the clock of FFT and the clock used for data transmission.
- A few frequencies are lost (2-4/4096)

Feature in FTT distribution:

- Modulo 4: the frequency is 10% than 3 other frequencies
- More serious problem: Reproduced with the simulation of Altera coreFFT : ~ almost understood : rounding on one of the 4 channels of Radix-4.

Data Transmission

Fix of synchronization issue (Th. Caceres and D. Charlet):

- Frequencies at the right position
- all the bytes transmitted
- Jitter (after FFT) 3-15 ps

Remaining problems:

- Last byte of second FIFO (Nyquist frequency) stuck to -7
- Problem of Jitter with 20% of the bunch for the 2nd FIFO ($f < 125\text{MHz}$)

Problème du "peigne" (Ch. FLOUZAT)

- La simulation fonctionnelle Matlab fait apparaître des saturations internes avec le core 12bits

[remontée du bruit de quantification en présence de signaux élevés]

- La simulation VHDL met en évidence une perte de dynamique liée au passage 8bits → 12 bits actuel

[corrigeable simplement, simulé, modif à tester sur table]

Problème du "peigne" (Ch. FLOUZAT)

Travaux en cours et futurs

- Continuer simulations vhdl
 - Reste des blocs à valider (bruit de calcul)
- Passer à une core 14bits
 - En cours: passage core FFT complexe → sortie FFT réelle
 - Difficultés potentielles avec la taille dans le fpga
 - Difficultés potentielles avec le débit de données

Conclusions

- Many improvements in the FFT since the first tests in June
- Problem of data transmission is almost fixed.
- Module 4 features in FFT: many ideas to solve the problem but need to be tested with "true" data