The Quest for the Fringe

VieVS User WS 2018
Vienna, 13.09.2018
Jakob Gruber

Requirements for the Quest of the Fringe

- **Hardware:**
  - Computer (maybe you want to have a fast one ;))
  - Disk storage
- **Software:**
  - Correlation software
  - Fringe-fitting software
  - (Cluster job scheduling software)
- **Data:**
  - Baseband data
  - Station log files
  - VLBI experiment file (VEX)
  - EOP data
- **Knowledge:**
  - How does a fringe actually look like?
  - Way of functioning of DifX
  - Way of functioning of HOPS/fourfit
  - Which correction might be applied in correlation/fringe-fitting?

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  - **Fringe-fitting software** → **HOPS**
  - **(Cluster job scheduling software)** → **SLURM**
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- **Data:**
  - **Baseband data → it is your input data (ask for data format)**
  - **Station log files → difference gps-time maser time**
  - **VLBI experiment file (VEX) → must have!**
  - **EOP data → to have precise apriori values**
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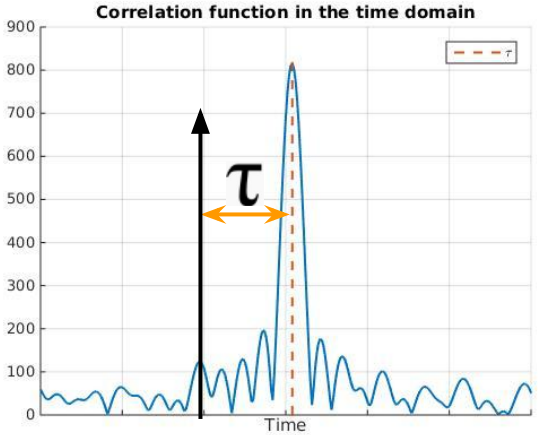
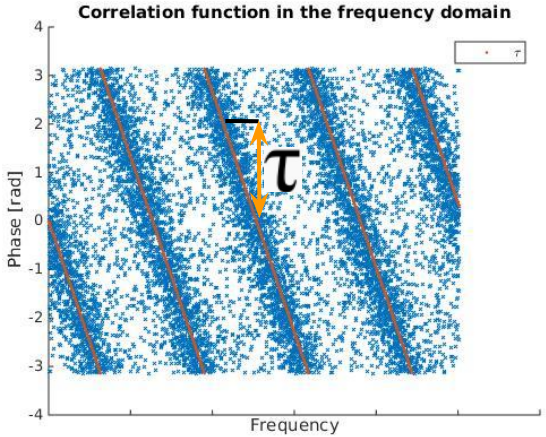
How does a fringe actually look like?

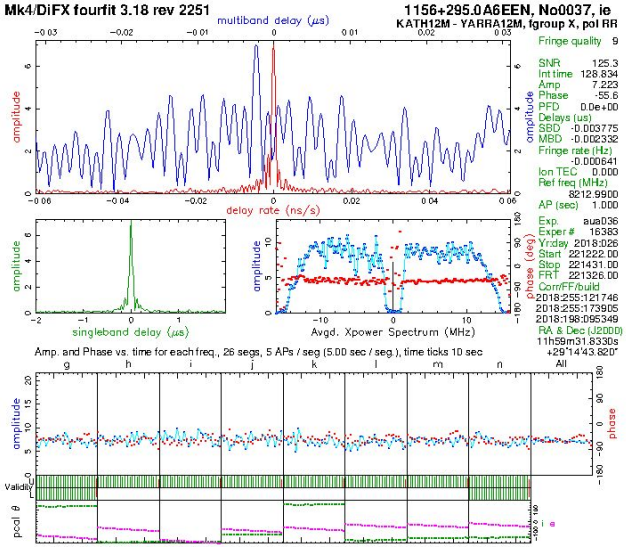
Delay function looks like a |sinc|



Phase spectrum shows straight phase progression



Phase straight line in time
Phase and amplitude significant in Xpower spectrum



How does a fringe actually look like? (through the eyes of fourfit)

Look for fourfit fringe quality: 0 → no fringe, 9 → perfect fringe

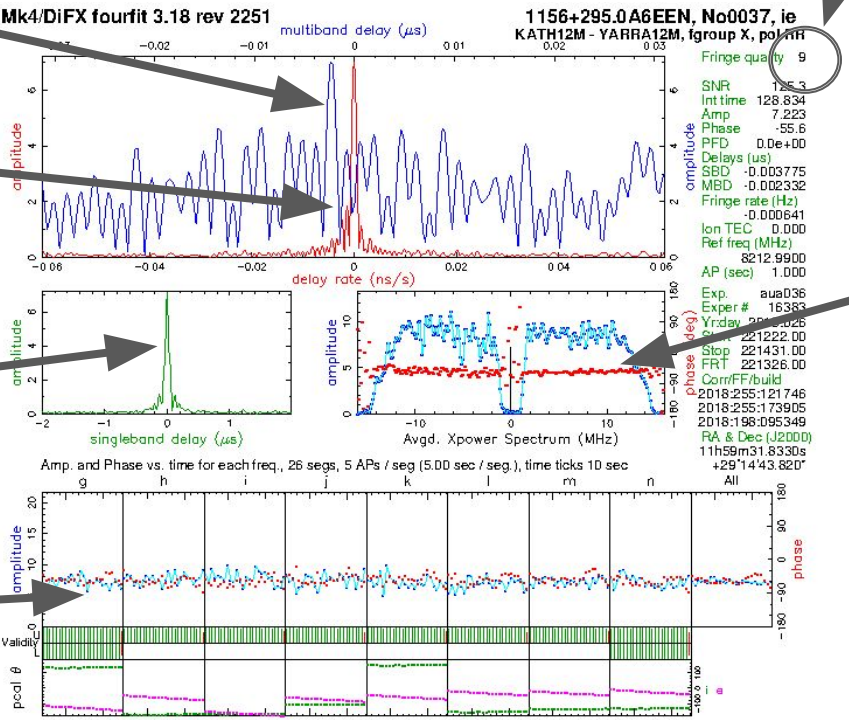
Look for sinc here

Delay rate tells you something about your apriori values. If at 0 ns/s you are doing a precise job!!

Look for sinc here!

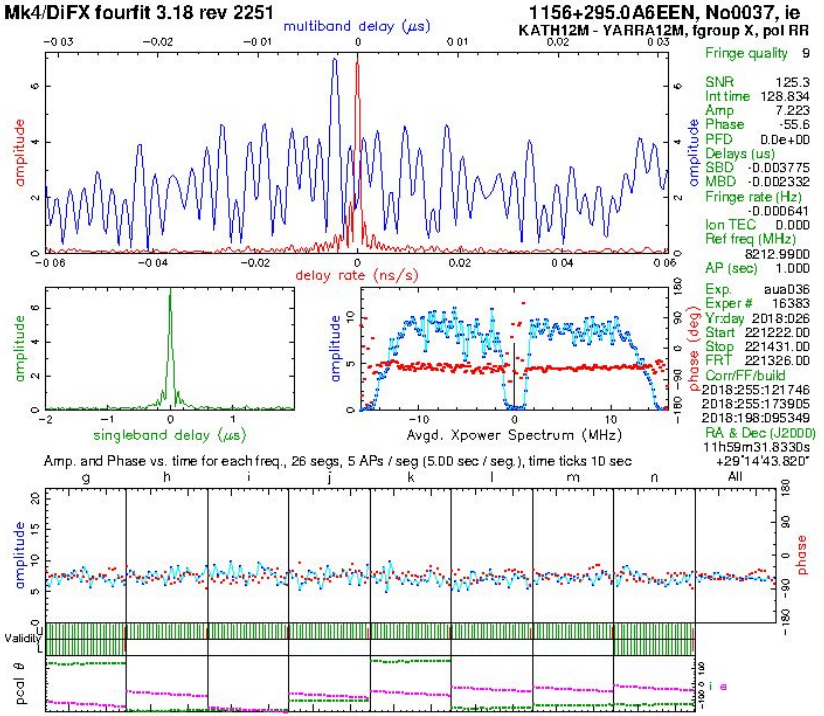
Look for flat phase and amplitude response here

Look for stable phase and amplitude over time



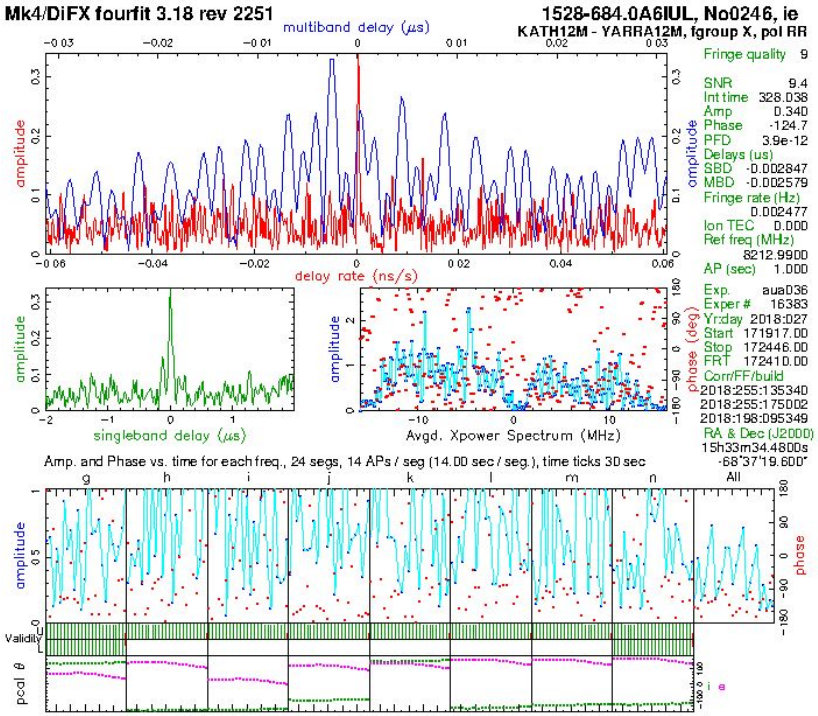
How does a fringe actually look like?

Yes, that is what we want to have!



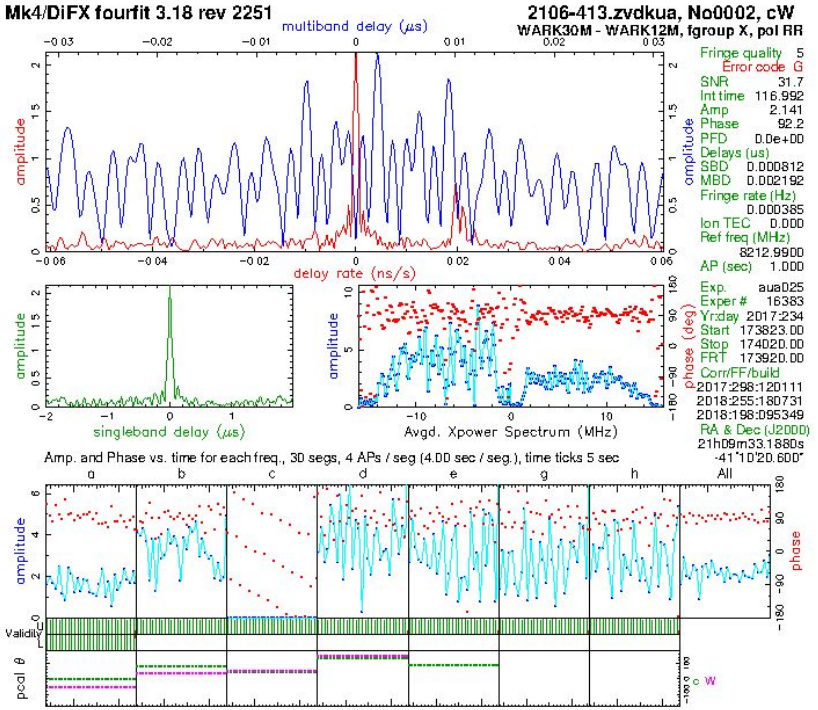
How does a fringe actually look like? (through the eyes of fourfit)

Yes, but …
SNR should at least larger than 10
SBD, MBD show weak peaks
Phase over time very noisy
Xpower spectrum, with imagination you detect a band shape
Handle with care, but fringe quality is 9!



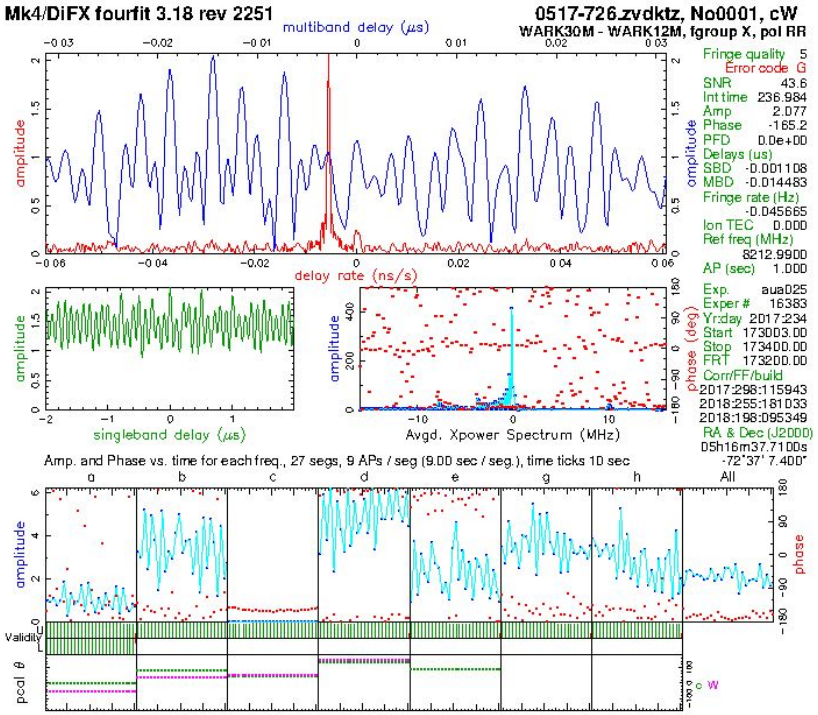
How does a fringe actually look like?

Yes, thats a fringe,
Channel c just does not get any power
Drop channel c and you are fine



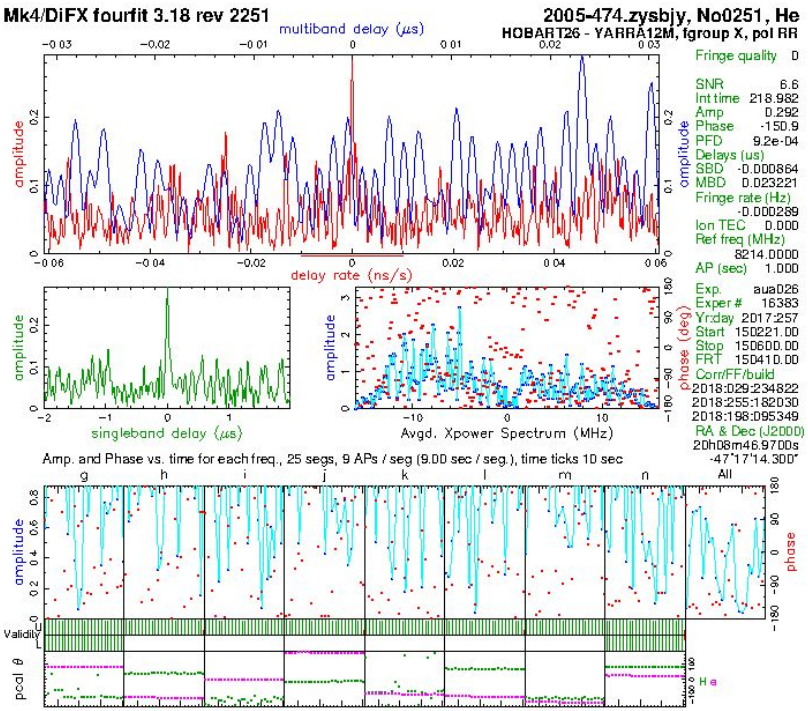
How does a fringe actually look like?

Ummmm, thats not a fringe.
Drop channel c and try/drop other channels keep in mind thats a local baseline



How does a fringe actually look like?

SBD shows a peak, BUT Xpower and phase over time looks very corrupt. Compare with fringe from aua036 scan No0246 Ke-Yg. This time fringe quality 0.



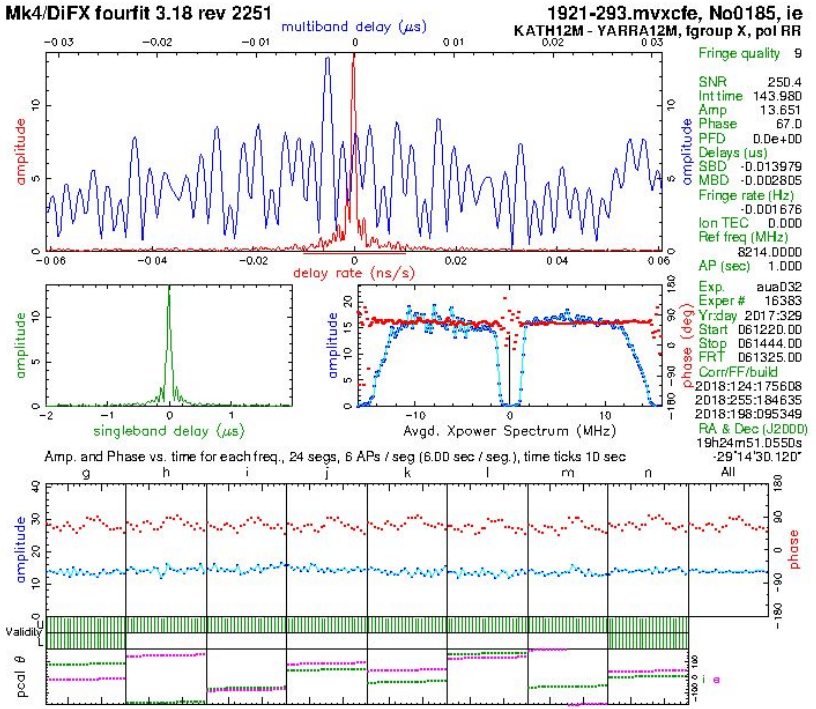
How does a fringe actually look like?

Yes, thats what we want to have!

Strong SBD peak

Flat phase, amplitude response in Xpower

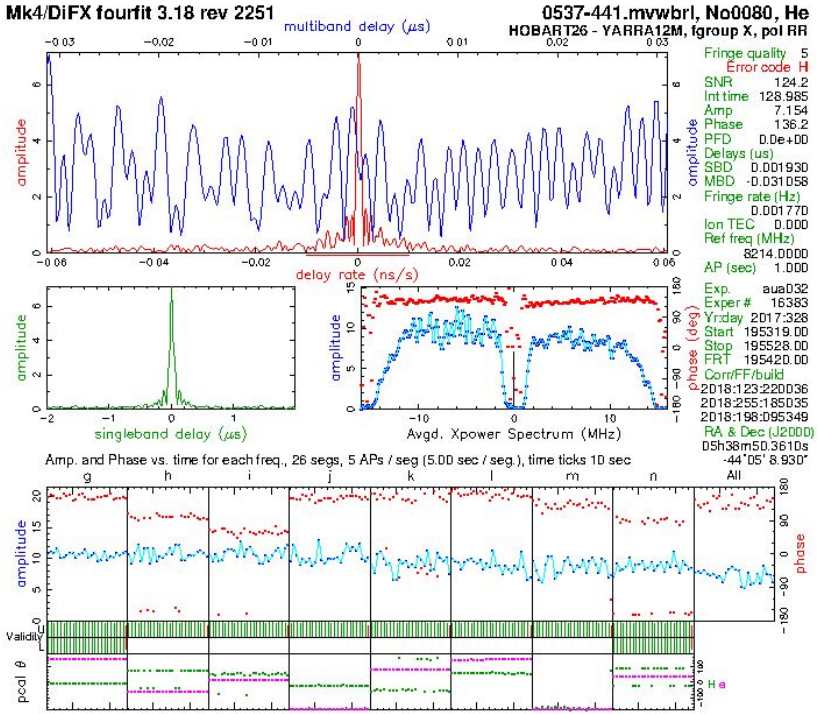
Stable over time



How does a fringe actually look like?

Yes, thats a fringe!

Phase offsets need to be corrected in phase calibration!



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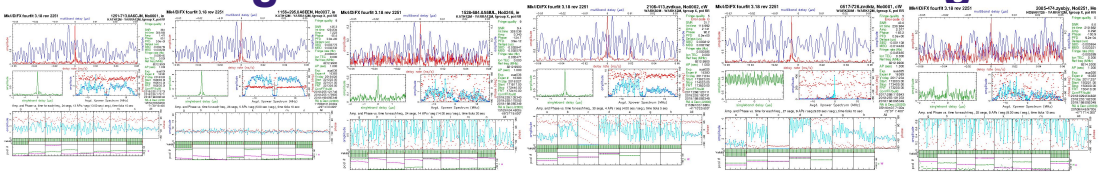
- **Knowledge:**
  - **How does a fringe actually look like?**

    → I think we got an idea what we are looking for



  - **Way of functioning of DifX → follow the recipe!!**
  - **Way of functioning of HOPS/fourfit → follow the recipe!!**
  - **Which correction might be applied in correlation/fringe-fitting? → Thats easy → Clock offset + rate!**

Advanced stuff in fringe-fitting (dropping channels, delay offsets, lsb offsets)