

LuMP Processing

An alternative recording method for some observations is with the LuMP software from MPIfRA. It has been used in the past for coordinated observations with FR606 and at the request of observers from the UK and Poland.

Any DSPSR sub-program (dsp_{sr}, digifil, digifits) can be used to process a LuMP observation, but each port/process (if using a multi-processed recording mode) must be processed separately and then combined (fils: filmerge, fits/ar: psradd).

So as an example, to process with digifil you may choose to process a set of observations using the command

```
for file in *.raw; do
[digifil -b-32 -F <NUMCHAN>:D -I 0 -c -set site="I-LOFAR" $file -o $file".fil"
done

filmerge *.raw.fil
```

To perform coherent dedispersion (`-F <CHAN>:D`) for a known pulsar target (inside LuMP metadata), without any bandpass/temporal offsets (`-I 0 -c`), producing a 32-bit output (`-b-32`) filterbank.

Many issues arise with modern versions of DSPSR when processing raw data, not limited to the dedispersion kernel failing, the default filterbank failing, misaligned folds when directly processing with DSPSR, etc. As a result we use a modified version of the workflow presented above for processing a typical LuMP observation.

```
baseName=$1

# Process the raw data with digifil. Perform 8x channelisation, 2x time scrunching (tsamp ~ 81us)
# Fake machine to COBALT as sigproc's filmerge will refuse to merge fils if the header is FAKE
for fil in *.00.raw; do digifil -b-32 -I 0 -c $fil -set machine=COBALT -set site=I-LOFAR -t 2 -F 328:1 -o $fil".fil" &
echo "hi" ; done; wait;

for fil in *.01.raw; do digifil -b-32 -I 0 -c $fil -set machine=COBALT -set site=I-LOFAR -t 2 -F 328:1 -o $fil".fil" &
echo "hi" ; done; wait;

for fil in *.02.raw; do digifil -b-32 -I 0 -c $fil -set machine=COBALT -set site=I-LOFAR -t 2 -F 320:1 -o $fil".fil" &
echo "hi"; done; wait;

# Each port should have the same number of samples and starting MJD; merge each of them
filmerge ./udp16130*raw.fil -o " /udp16130. "$baseName".fil"
```

```
filmerge ./udp16131*raw.fil -o "/udp16131_"$baseName".fil"
filmerge ./udp16132*raw.fil -o "/udp16132_"$baseName".fil"
filmerge ./udp16133*raw.fil -o "/udp16133_"$baseName".fil"

for fil in udp*"$baseName".fil; do digifil -b 8 $fil -o $fil"_8bit.fil"; done

# Fold the data, 1024 bins, ~3 secnd integration (change turns as needed)
for fil in *_8bit.fil; do dspwr -turns 4 -nsub 512 -t 4 -b 1024 -skz -skzn 4 -k lelfrHBA -O $fil"_fold" $fil; done

# Attempt to combine the data. This will not work 90% of the time due to packet loss, but worth trying.
psradd -R *.ar -f $baseName".ar"
```

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