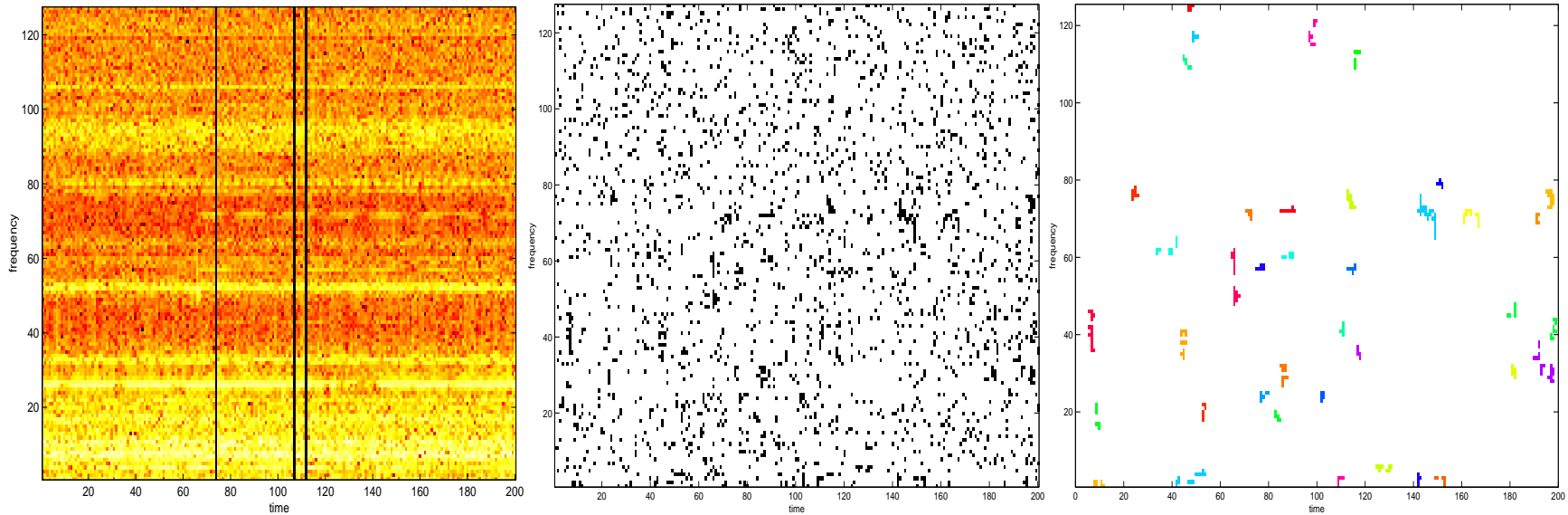


Bursts in E2 data

Julien Sylvestre
LIGO-MIT

LSC Meeting, March 2001

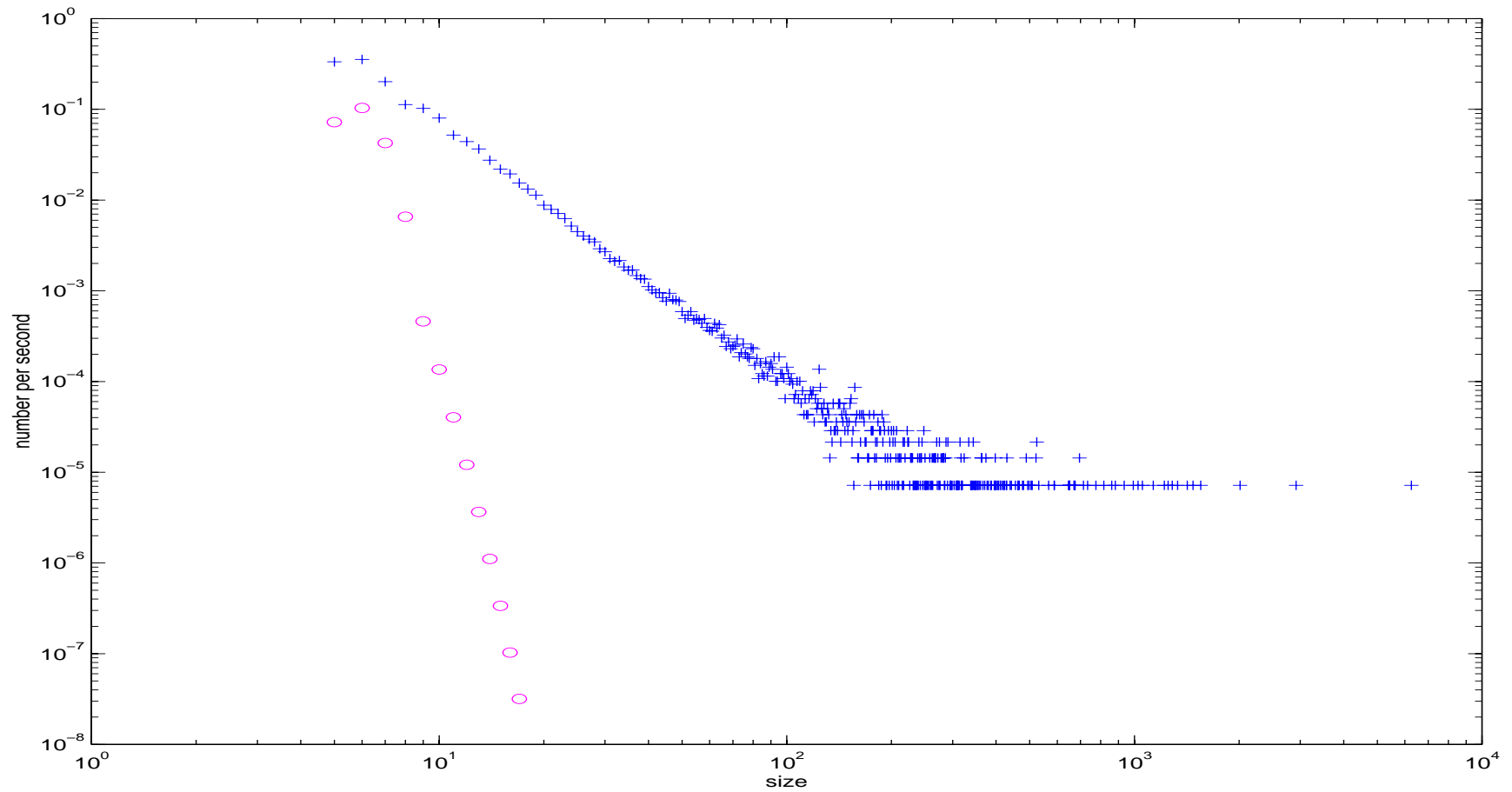
Time-Frequency Detection



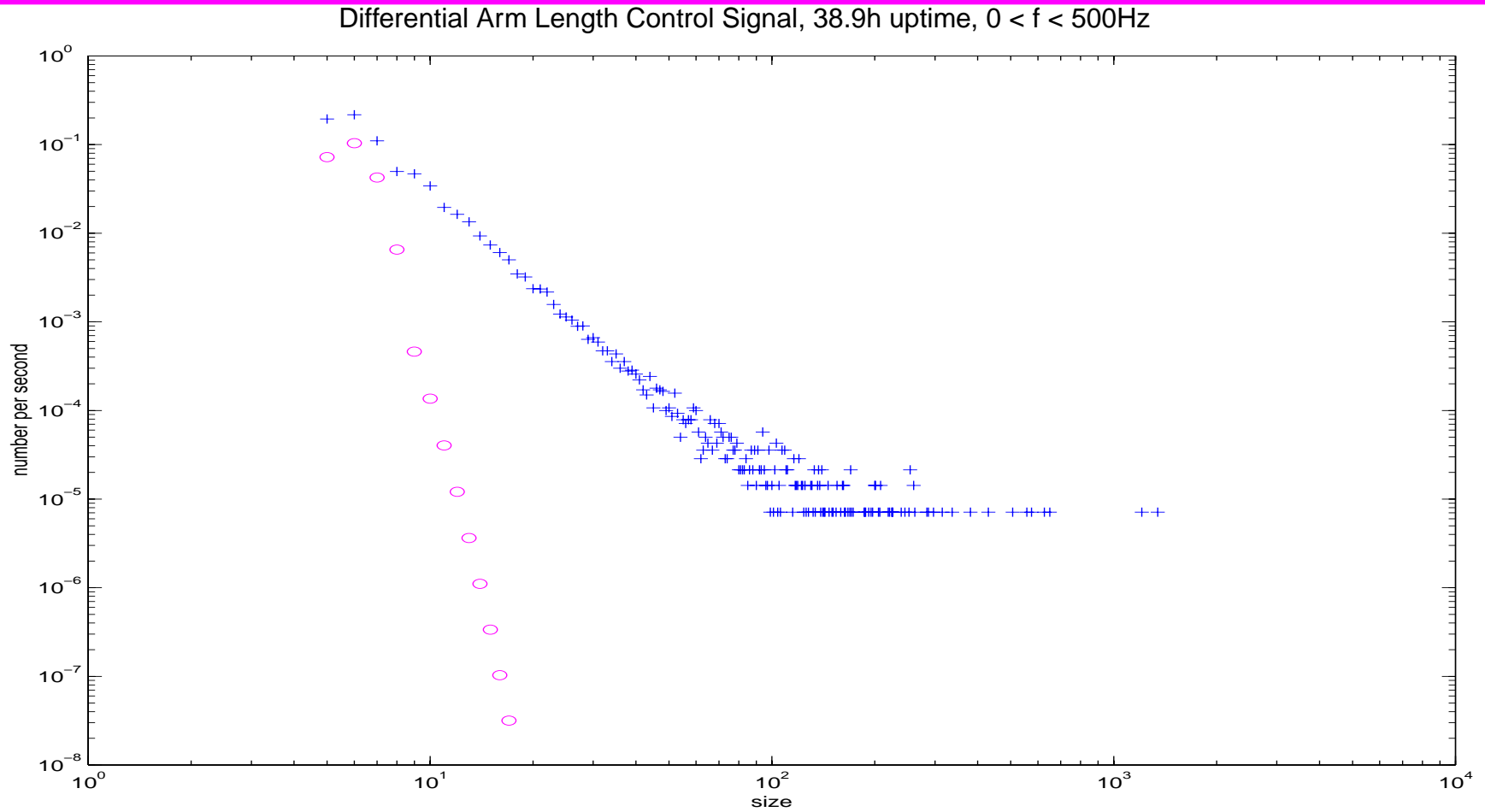
- Compute spectrogram; threshold on power, get uniform black pixel probability
- Look at clusters in black and white image; threshold on size or on size and distance for pairs of clusters

Bursts rate

Common Arm Length Control Signal, 38.7h uptime, $0 < f < 500\text{Hz}$



Bursts rate



Finding coincident bursts using cross-correlation

For the case of bursts with higher SNR in PEM than in IFO channel:

- run cluster detection on PEM channel
- run pattern matching for some class of bursts; generate list of 'On' times
- compute cross-correlation, weighted by class filter, for 'On' times and random 'Off' times
- compare statistics of the 'On' and 'Off' populations

Examples of coincident bursts

- Narrowband signals

- ››duration: 100-300s

- ››rate: 0.5/h - 2/h

- ››frequencies:

- 55, 57, 71, 72 Hz

- 58, 59 Hz

- 56, 57 Hz

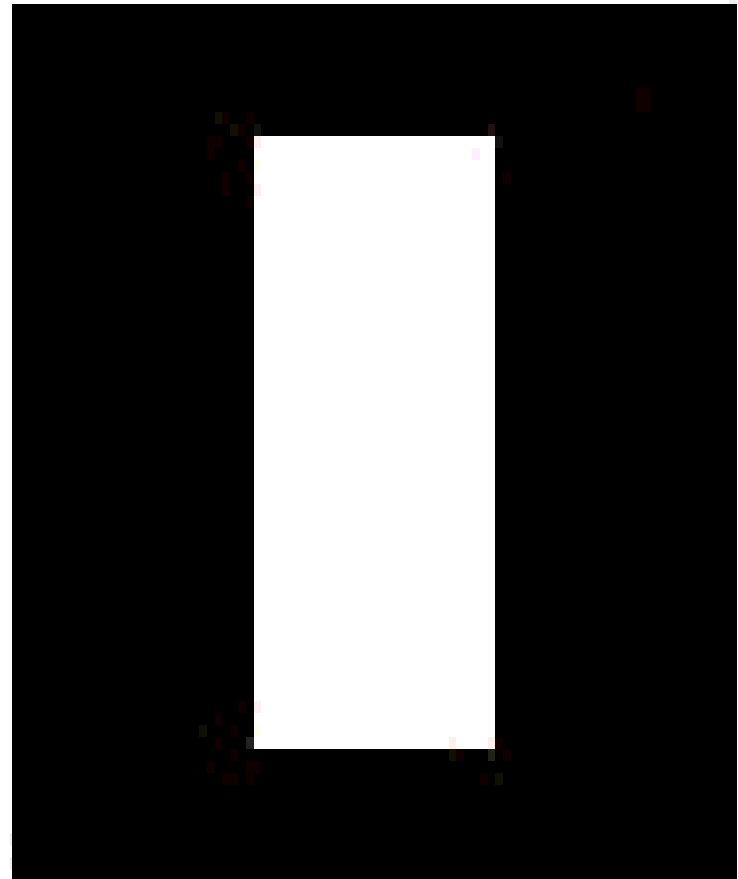
- ››detected in LVEA accelerometers

- ››strongly couple to CARM_CTRL



Examples of coincident bursts

- Broadband signals
 - ››duration: 1-30s
 - ››rate: 0.6/h
 - ››frequencies: $15 < f < 35$ Hz
 - ››detected in LVEA seismometers
 - ››couples to CARM_CTRL



Linear vs bilinear coupling

- ‘Simple’ story for linear coupling; procedure can be automated
- Not trivial for non-linear couplings...

›› AM signal in CARM_CTRL

›› get envelope by mixing down with sine wave

›› No significant cross-correlation detected with PEM (seismometers, accelerometers, magnetometers, tiltmeters)

