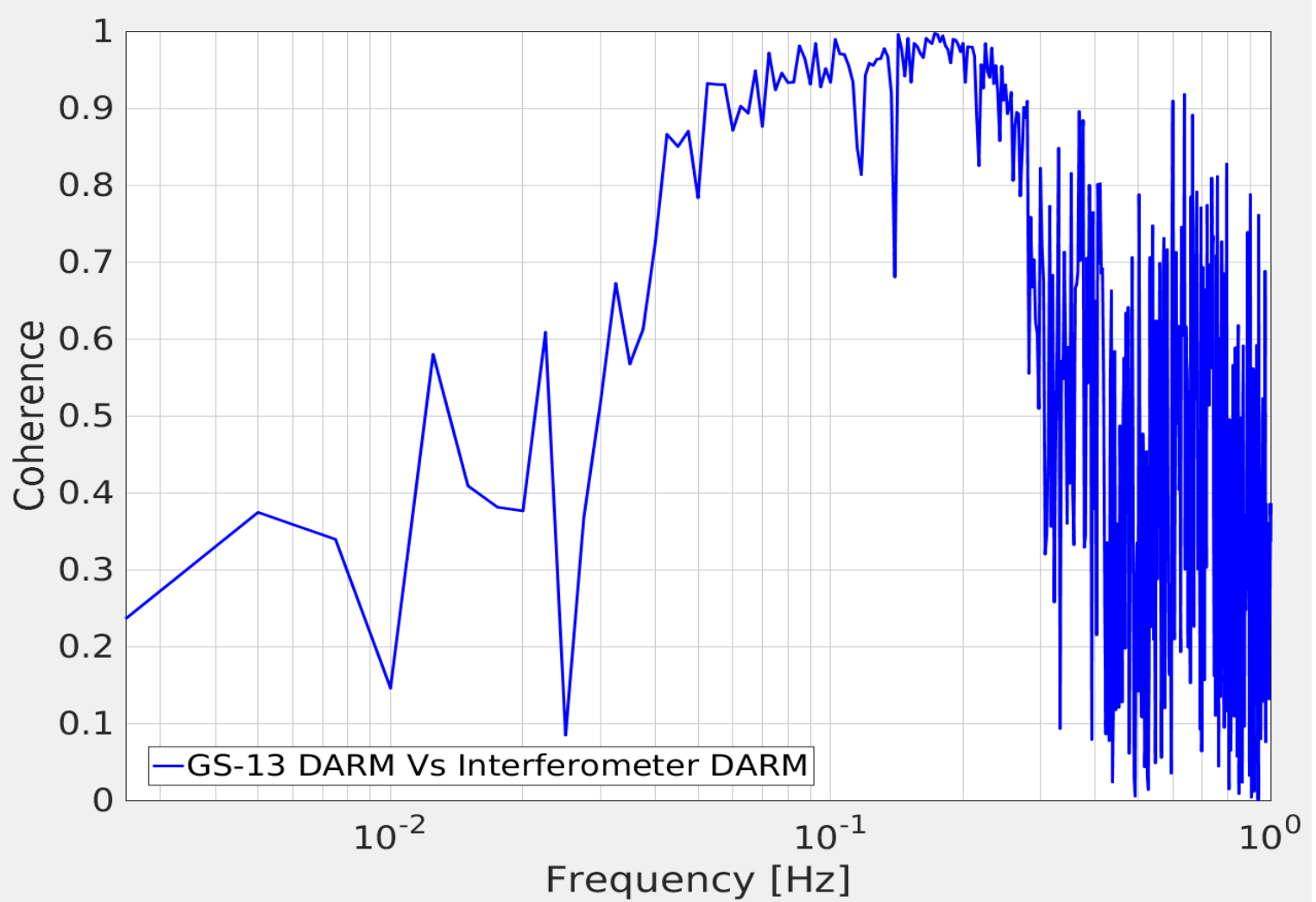
Improving DARM with ISI→ SUS feedforward (short version)

Edgard Bonilla

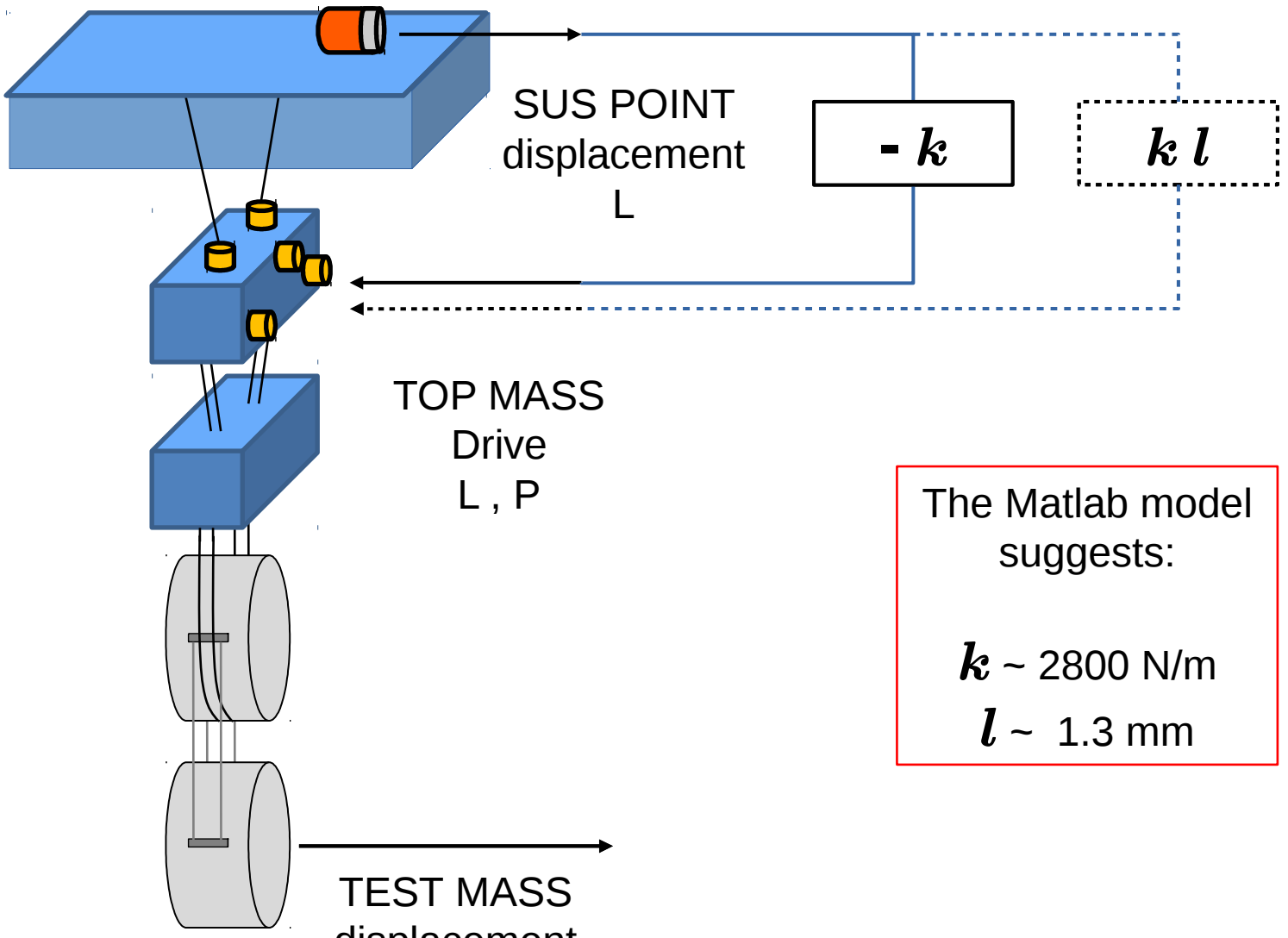
Motivation:



High coherence from 60 – 300 mHz

Credit: Conor Mow-Lowry - SEI log 1237

Feedforward Diagram



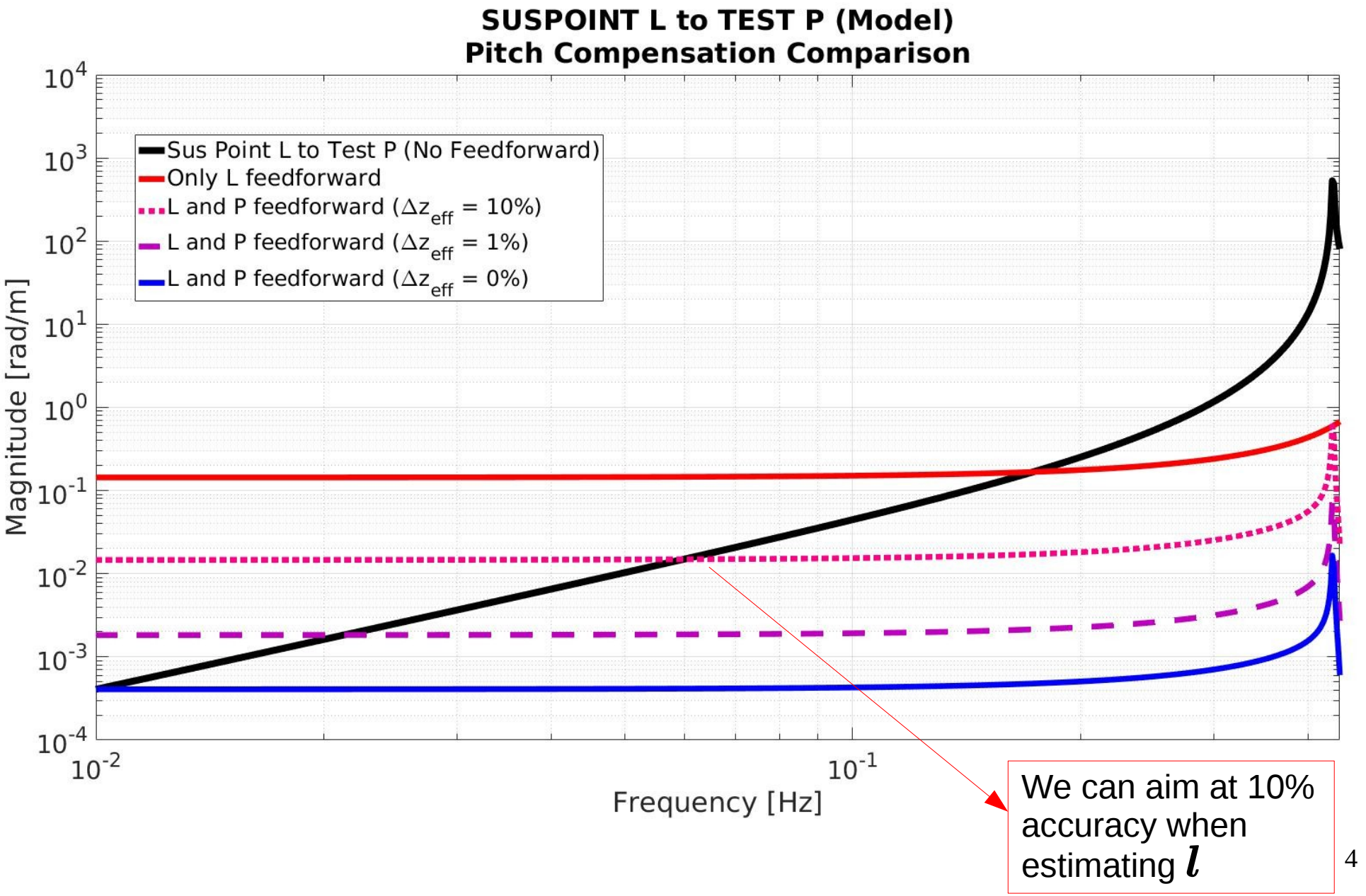
The Matlab model suggests:

k ~ 2800 N/m

l ~ 1.3 mm

= GS13

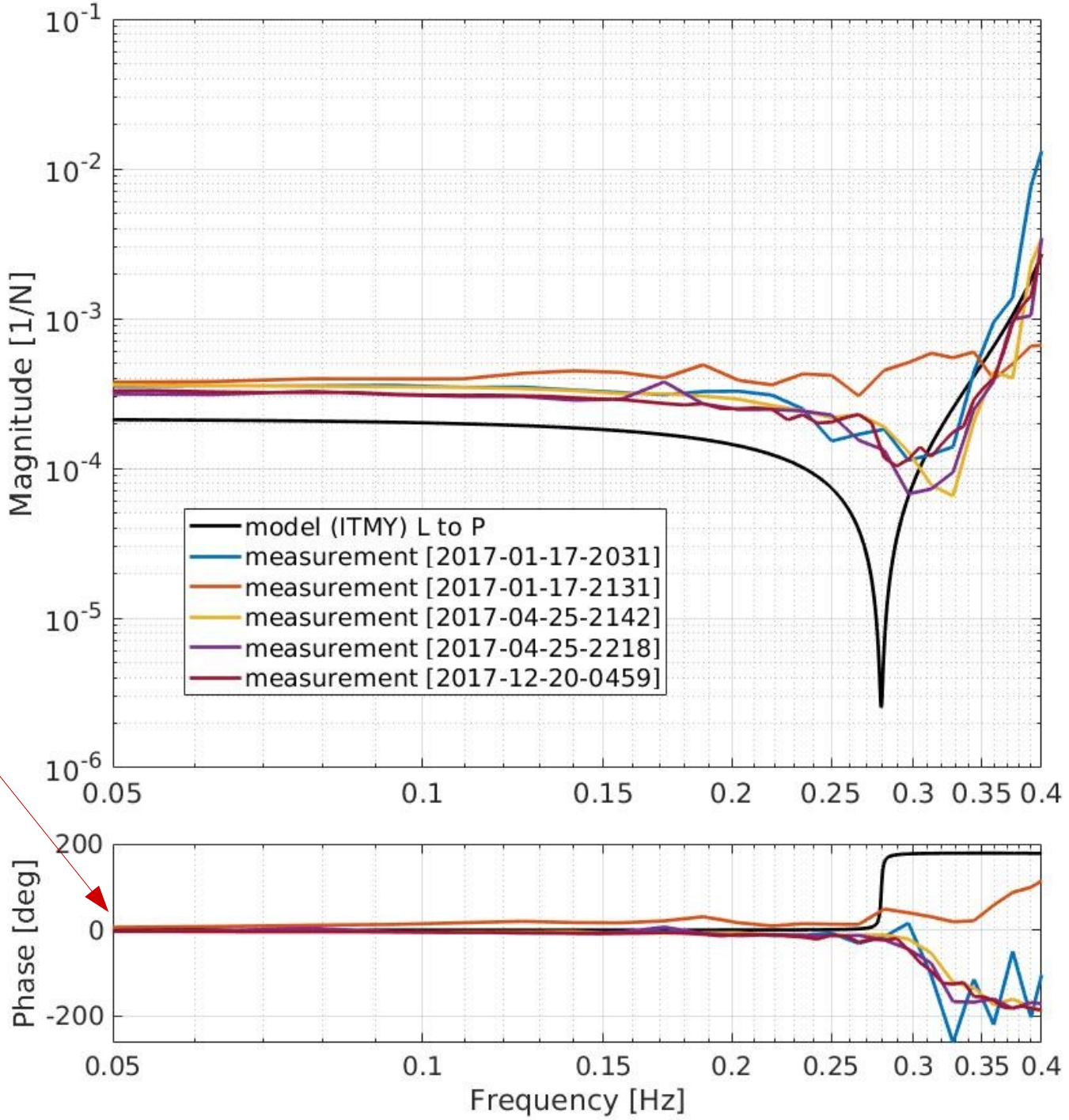
= Top Mass OSEM



We can aim at 10% accuracy when estimating l

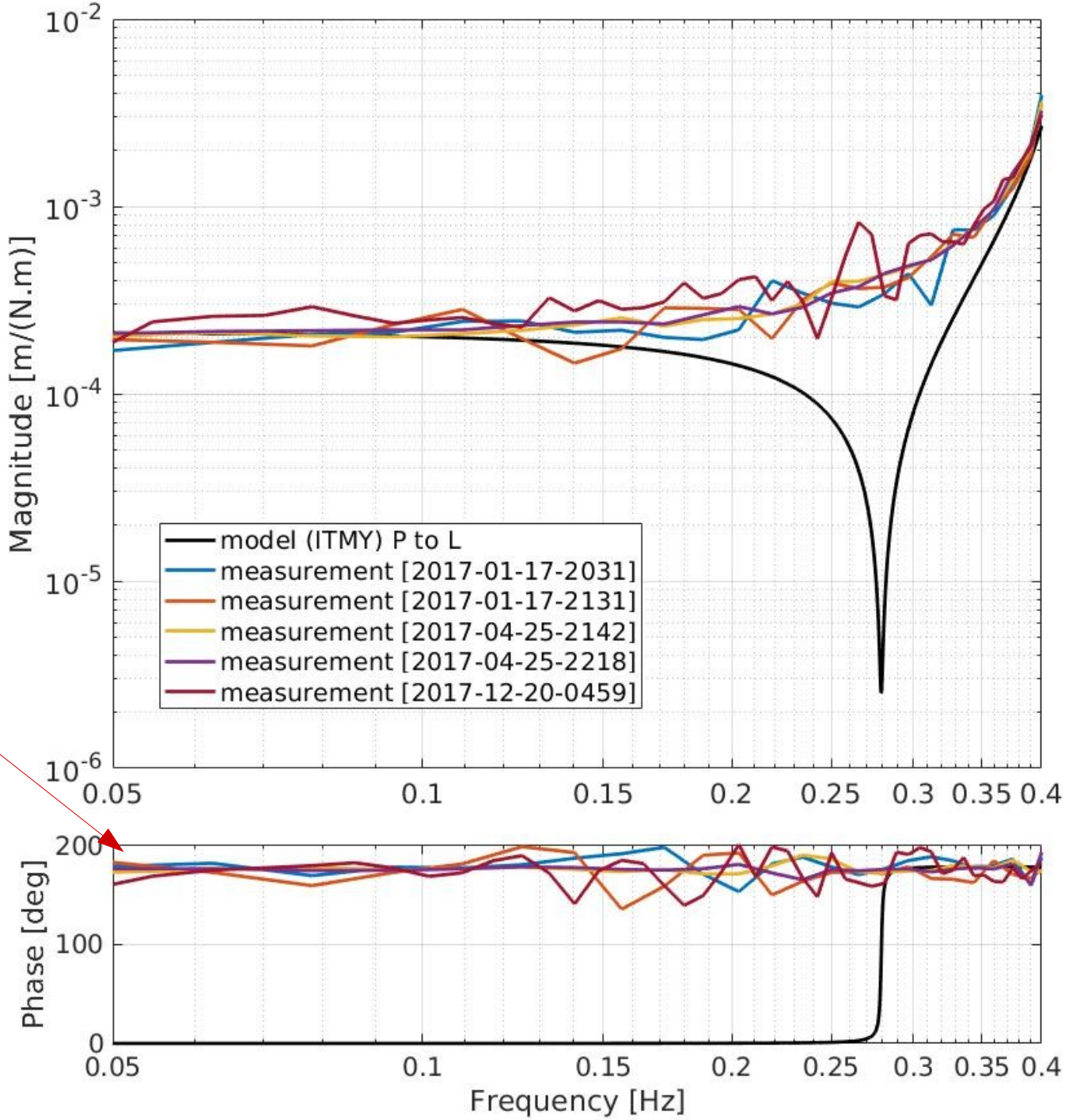
- Edgard Bonilla, SEI log 1325

H1 ITMY Top Mass L to P Transfer Function



0 degrees

H1 ITMY Top Mass P to L Transfer Function



180 degrees

- From O2 we gather the values for the corner station quadruples at H1:

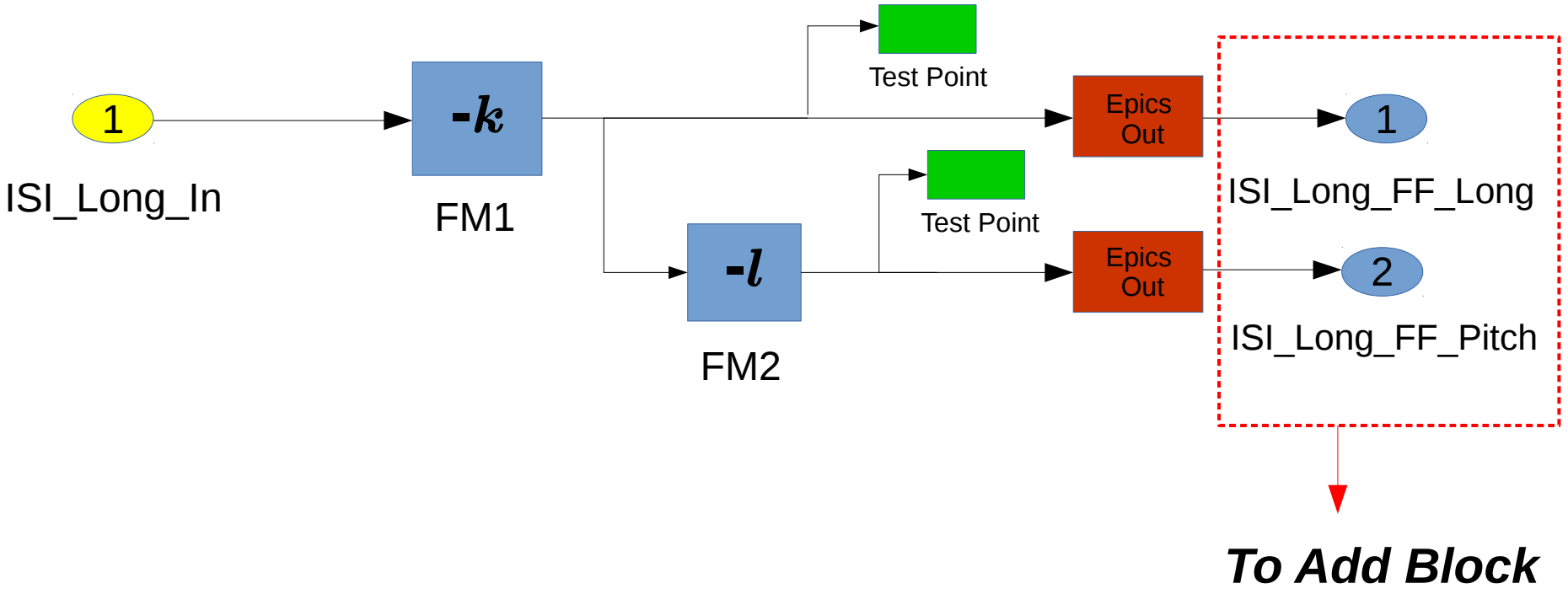
$$\text{ITMX:} \qquad \bar{l} = -9600\mu\text{m} \quad , \quad \Delta l = 1200\mu\text{m} \quad , \quad \frac{\Delta l}{|l|} = 12.5\%$$

$$\text{ITMY:} \qquad \bar{l} = 2670\mu\text{m} \quad , \quad \Delta l = 280\mu\text{m} \quad , \quad \frac{\Delta l}{|l|} = 10.5\%$$

- The non-reciprocity makes it hard to know if the absolute or relative error is the correct metric for accuracy.

- Testing this directly with the top mass at one of the sites might be a better option.

Feedforward tentative Diagram



- The FF would be active at both M0 and R0. Brian suggests that the Beam Splitter should have a similar compensation

- These filters should be turned on after the Seismic system is in the ‘Isolated’ state.

- Tuning should start by finding l . This can be done by taking top mass transfer functions only.

- We can find k by either taking a transfer function from ST2 X to M0 or estimate it from first principles. In either case, fine tuning by measuring M0 TFs is necessary.

- The coherence between GS13-DARM and DARM / DHARD could inform for readjustments