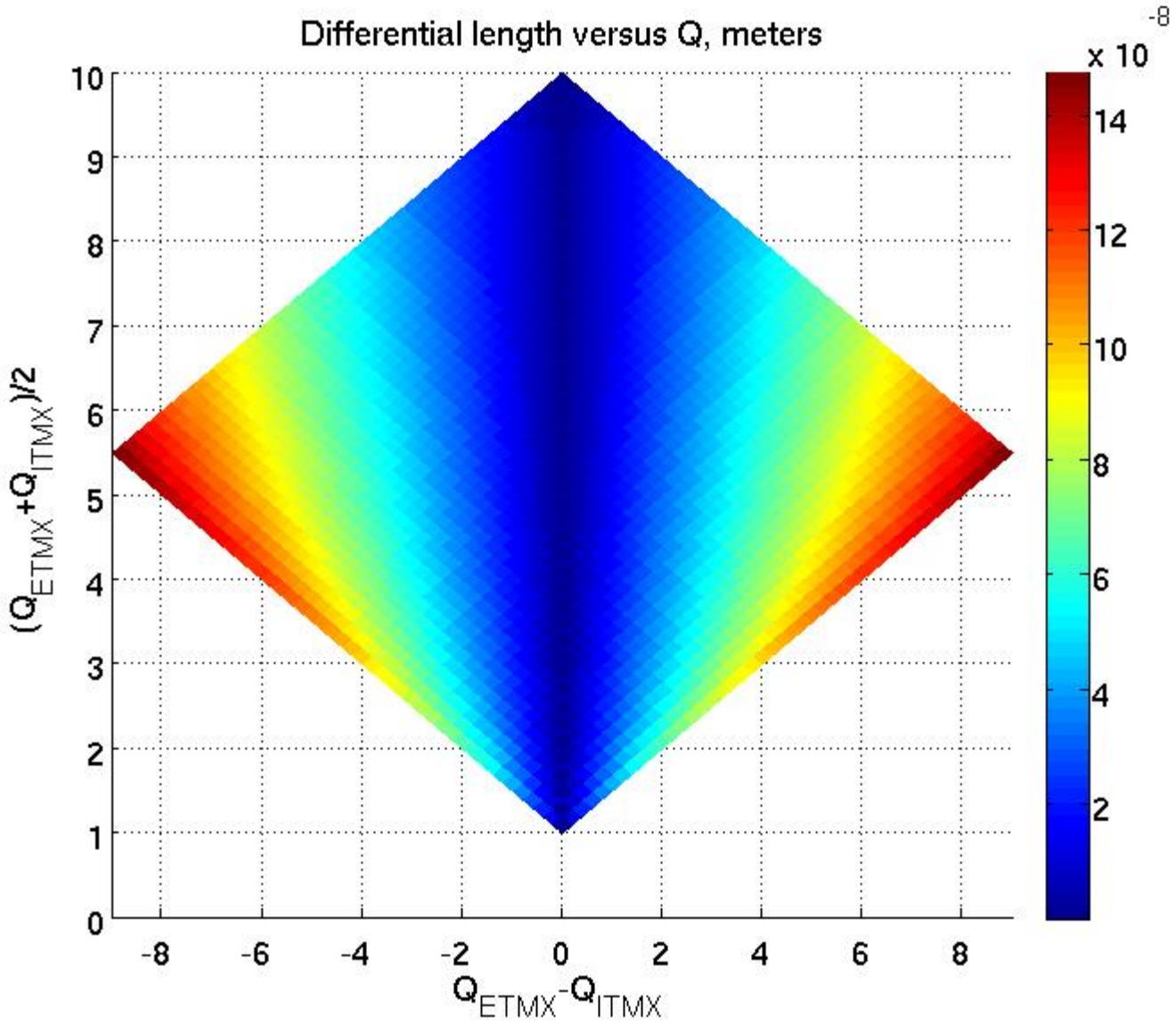
# New results of XARM measurements

attempts to minimumize RMS
of peaks from the spectrum of channel
C1:LSC-XARM-CTRL
as we change the values of suspension
damping gain in channels
C1:SUS-Mirror-SUSPOS_GAIN

(Mirror = ‘ITMX’ or ‘ETMX’)

# Reminder (from 2007) : theoretical idealized model



# Essence of what has been done

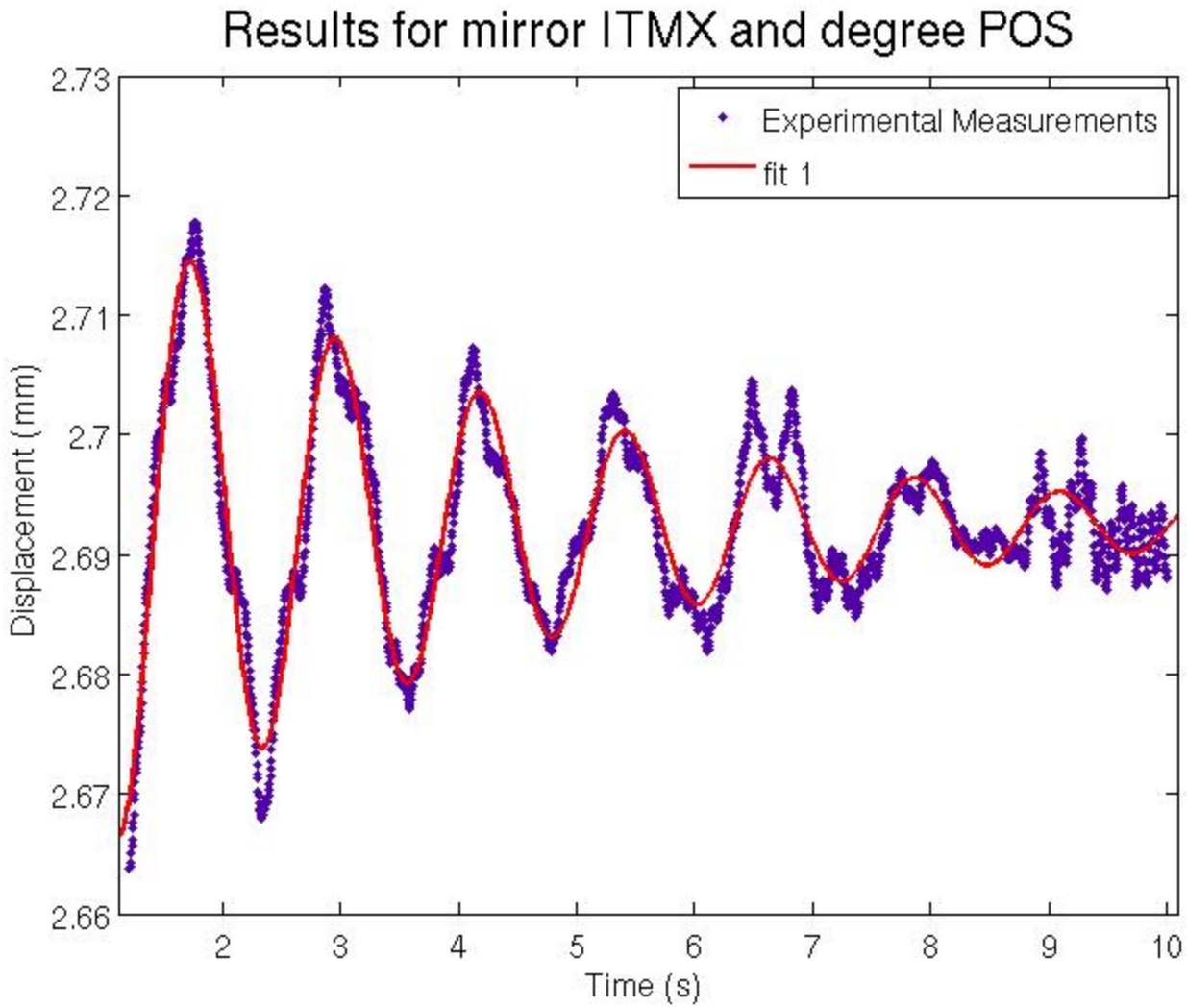
- I measured dependences of RMS in three regions
  (peak near 0.8Hz, peak near 3Hz,
  RMS in the region 0.6hZ < f < 3.6Hz)
  on the values of suspension damping gains
  of ITMX and ETMX
  (channels C1:SUS-ITMS_SUSPOS_GAIN,
  C1:SUS-ETMX_SUSPOS_GAIN) ,

and converted them into dependences on Q-factors
$Q_{ITMX}$ and $Q_{ETMX}$

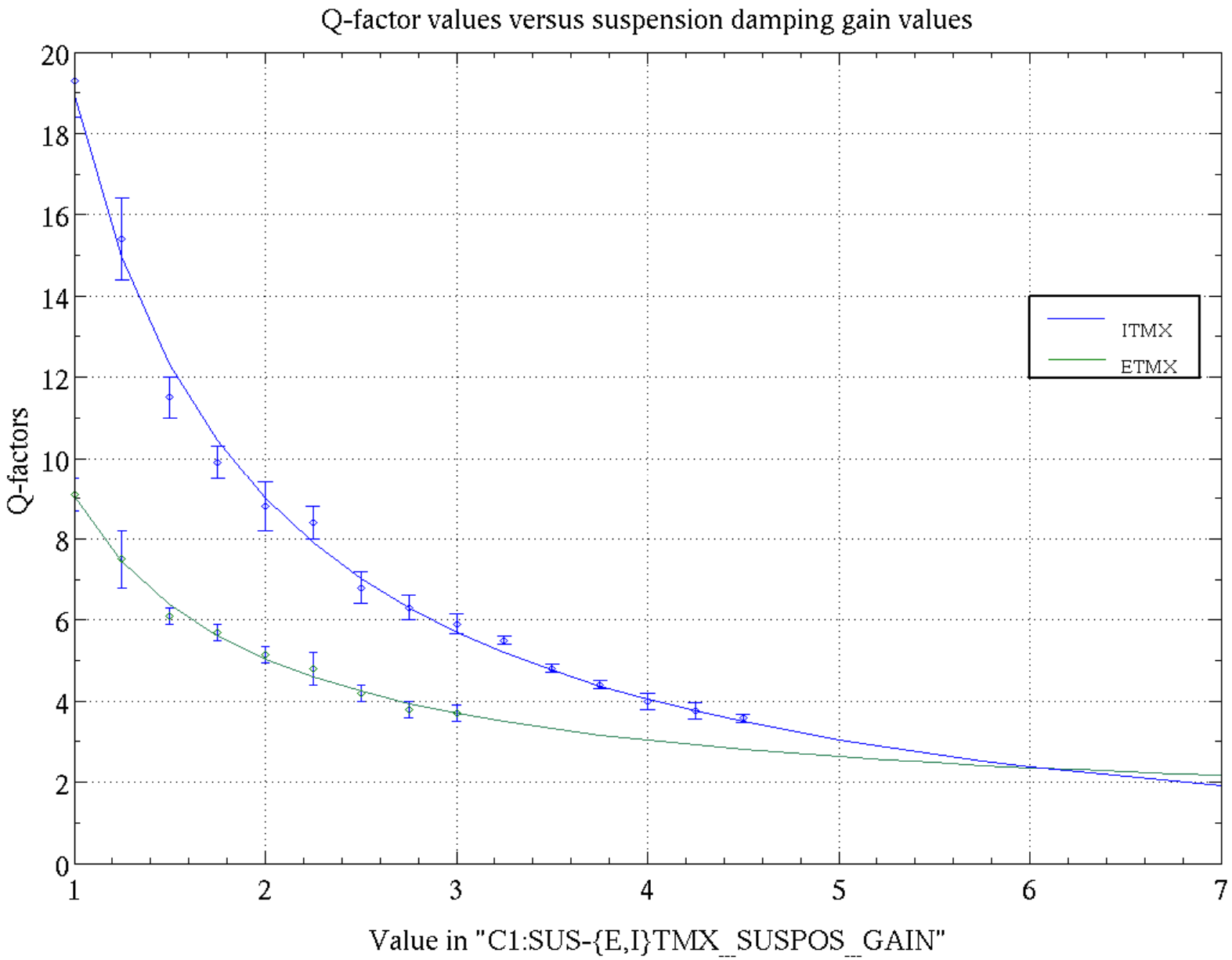
(for comparison with theoretical model)

# Determine Q-factors

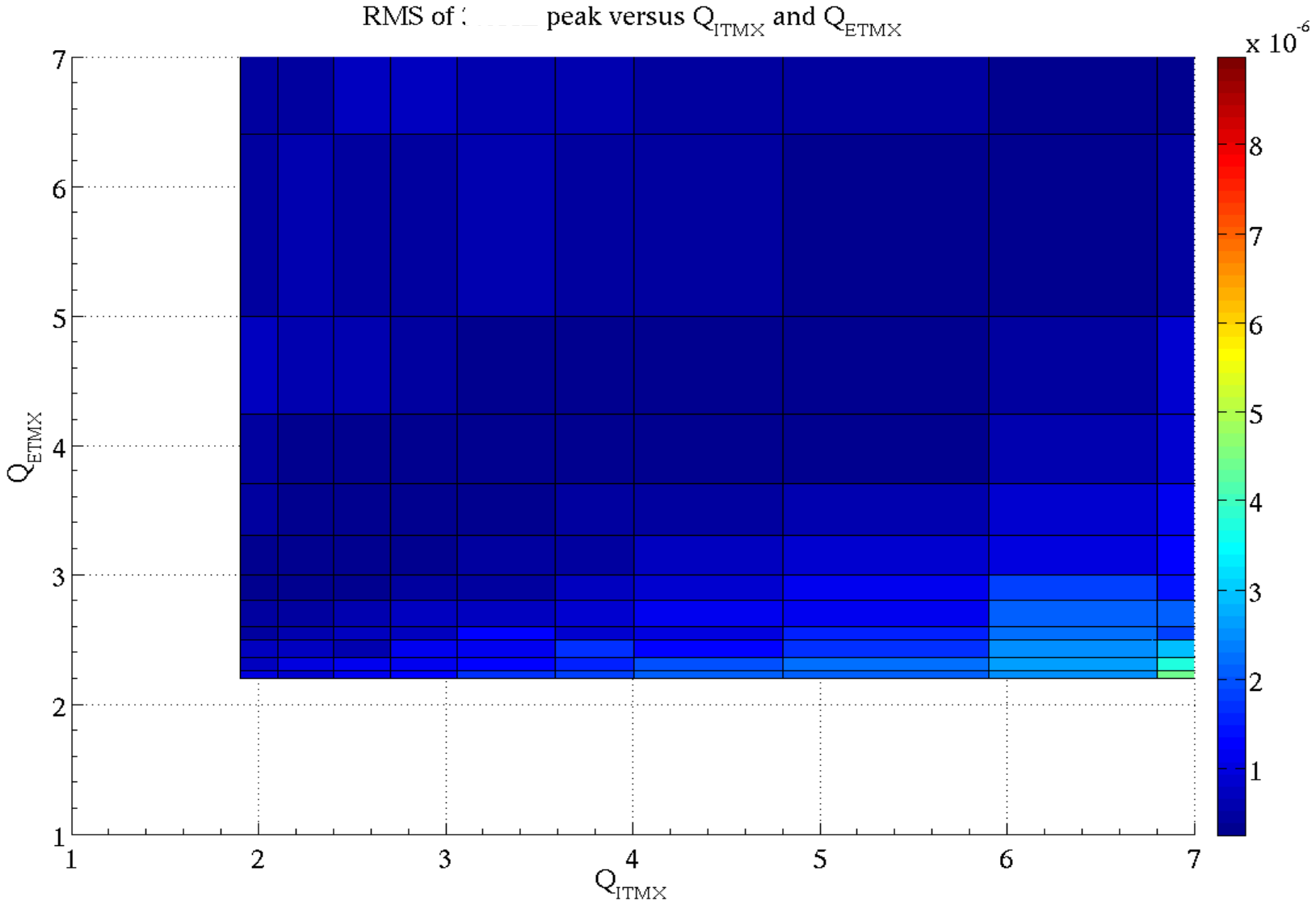
- Ringdown measuremets. $Q = \pi f_0 \tau_0$



# Result: $Q_{ITMX}$ and $Q_{ETMX}$ values

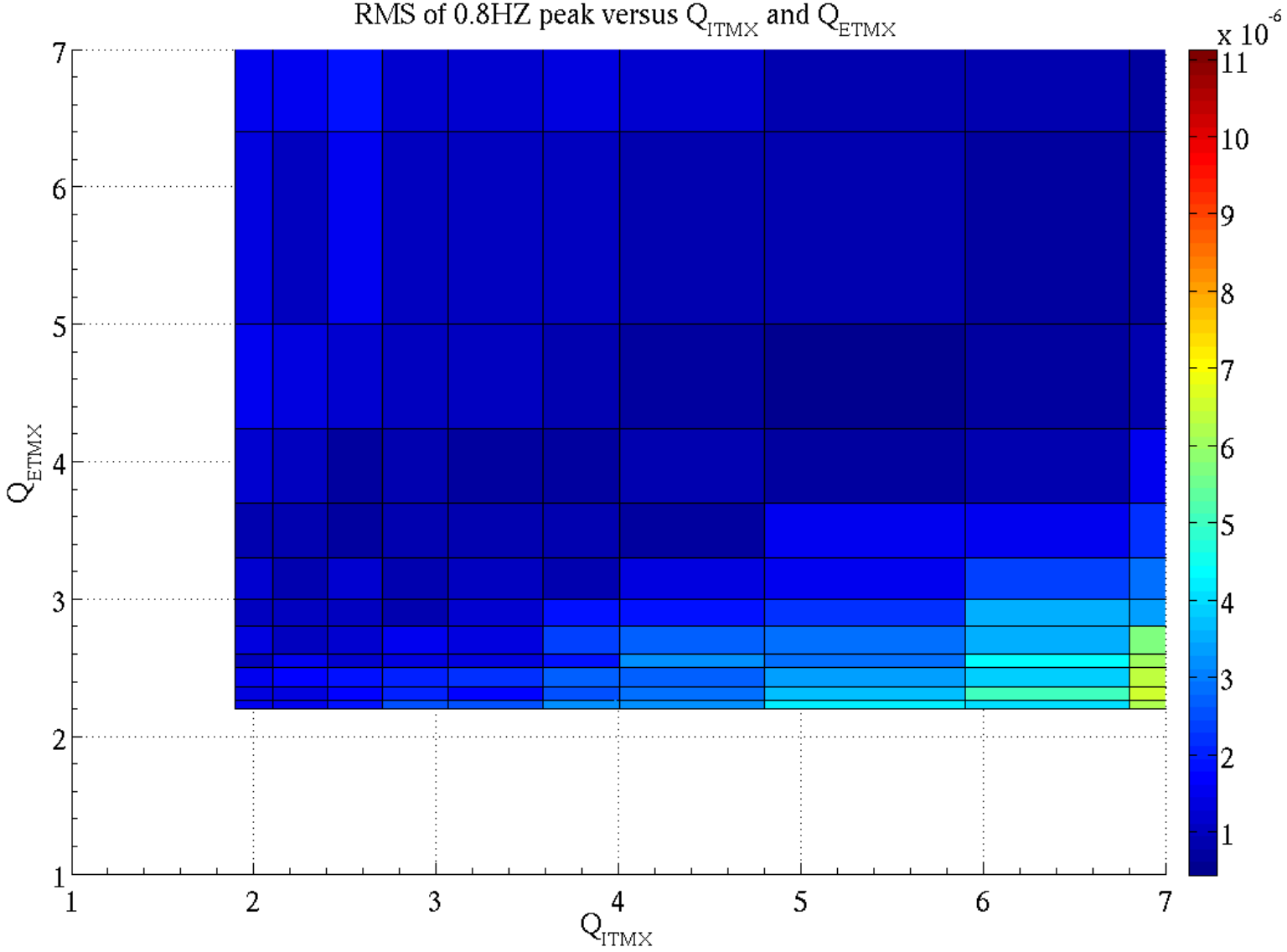


# Results of measurements of RMS

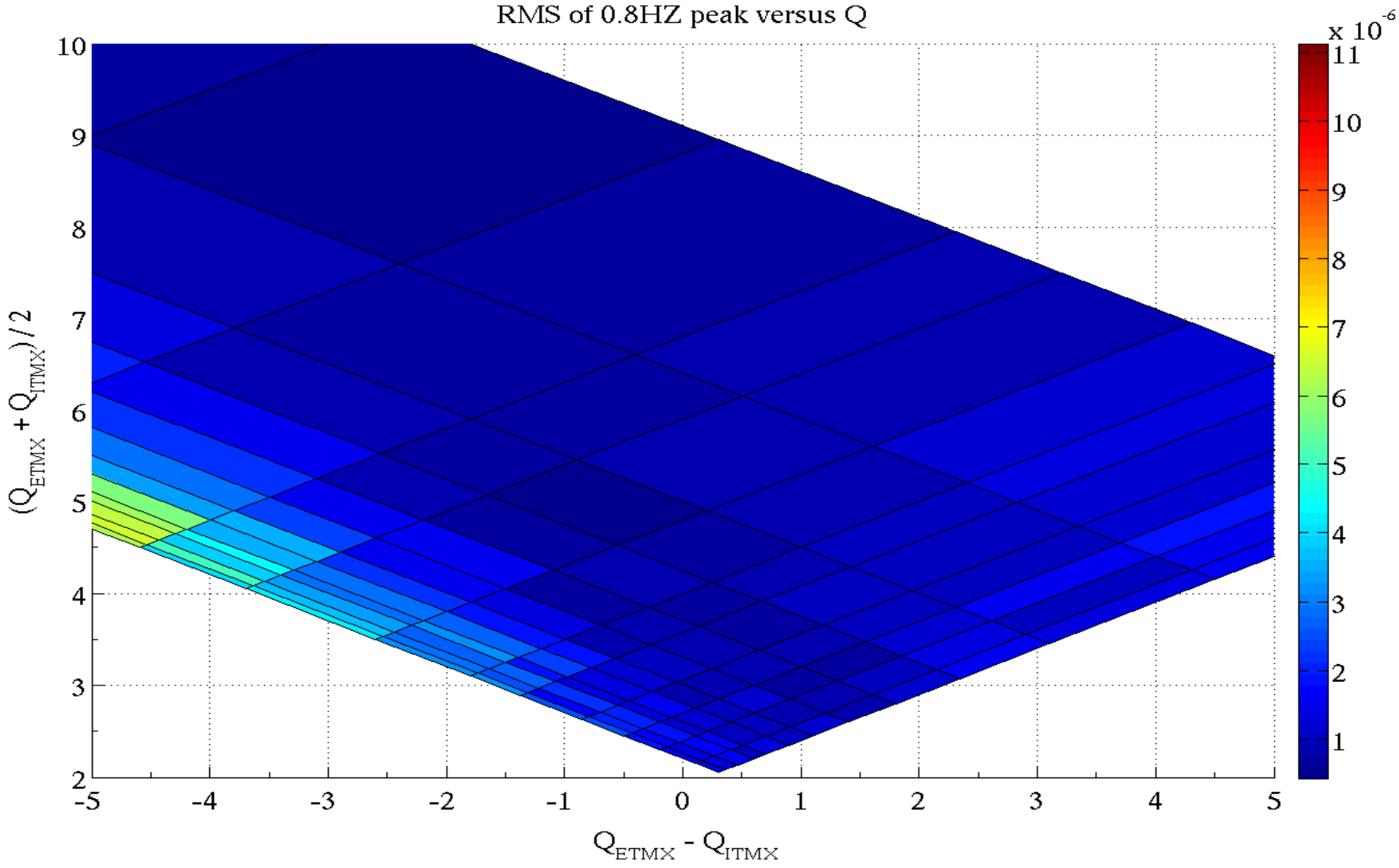



RMS of peak at 0.8 Hz (December 2007 measurements)

# Results of measurements of RMS

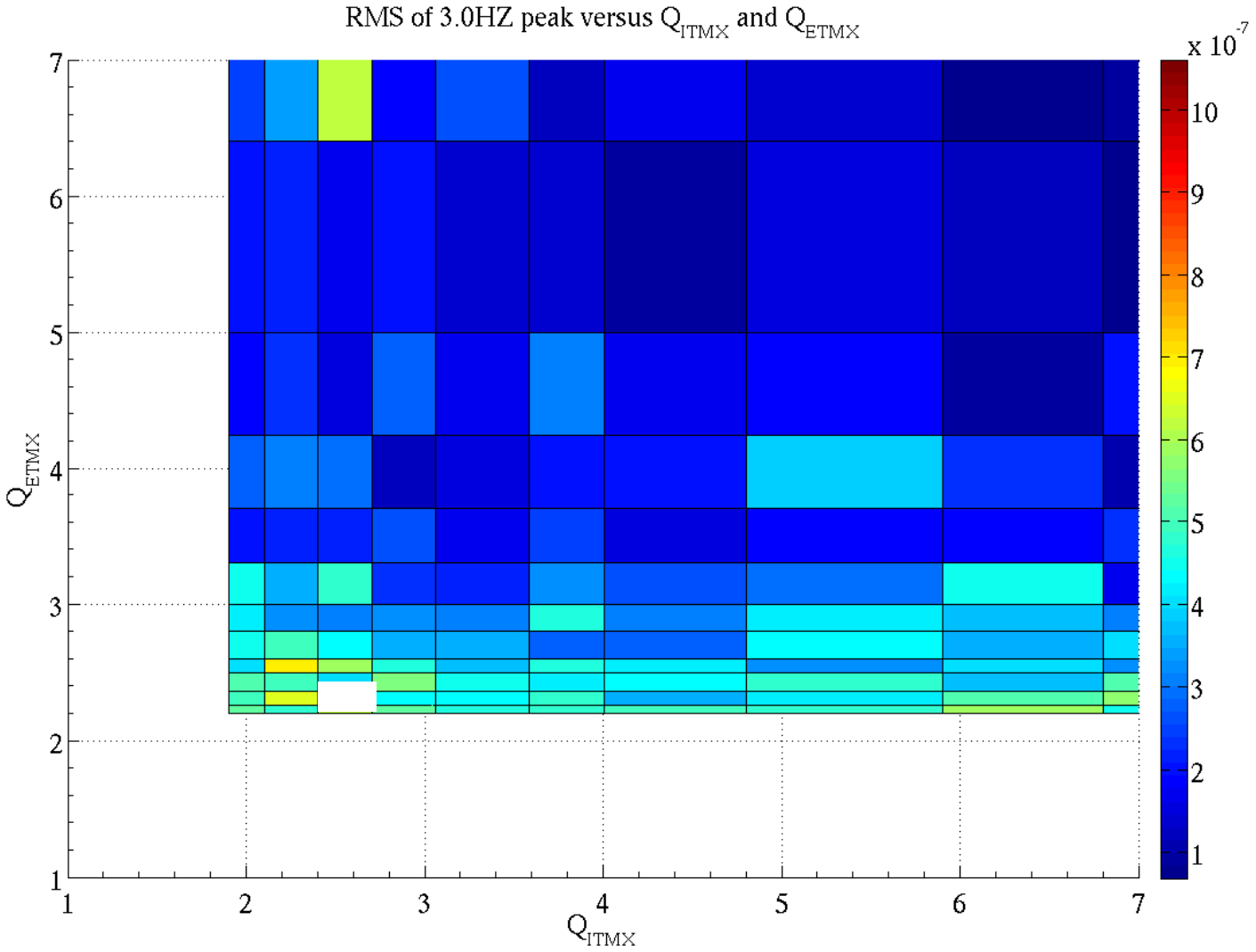



RMS of peak at 0.8 Hz (January 2008 measurements)

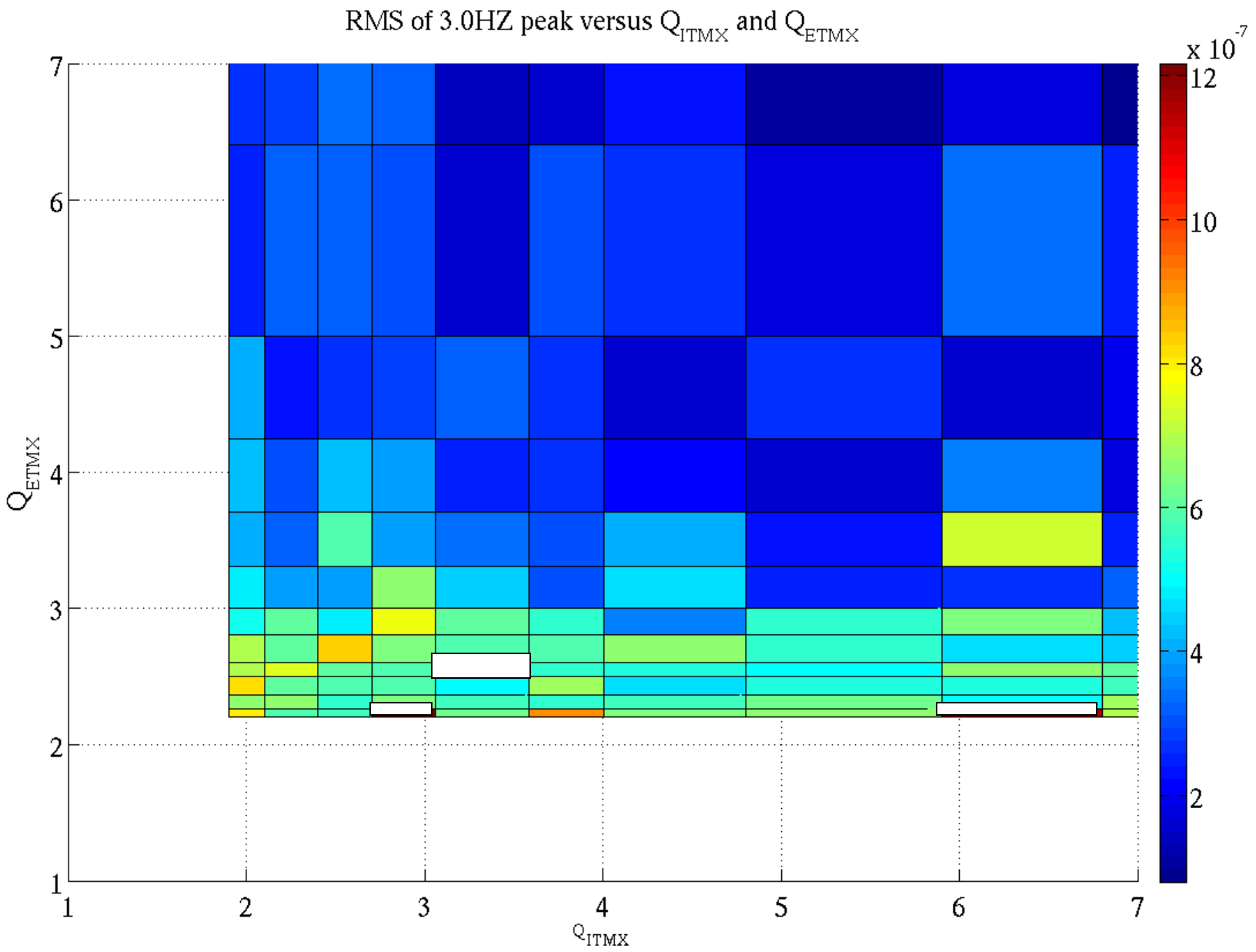



RMS of peak at 0.8 Hz (January 2008 measurements)

# Results of measurements of RMS: ~3.0 Hz




RMS of peak at ~3.0Hz (December 2007 measurements)




RMS of peak at ~3.0Hz (January 2008 measurements)

# Comments about the dependences

- Good repetitiveness from day to day (night to night), so there is no reason not to believe to those measurements.

- Pretty clear minimum for 0.8Hz for close values of Q-factors in ITMX and ETMX.
- Not always a distinct peak at ~3.0Hz -> no clear minimum, but clearly region of small Q is not good for us.

- Note: Equality of Q-factors for ETMX and ITMX does not mean equality of suspension damping gains!

- I cannot compare *quantitatively* the model and the experimental RMS results, because RMS~$\Delta$f.
- Probably, regime with both Q equal to 5 is optimal?