

# **Sensing and Control of the AEI-10m frequency reference cavity**

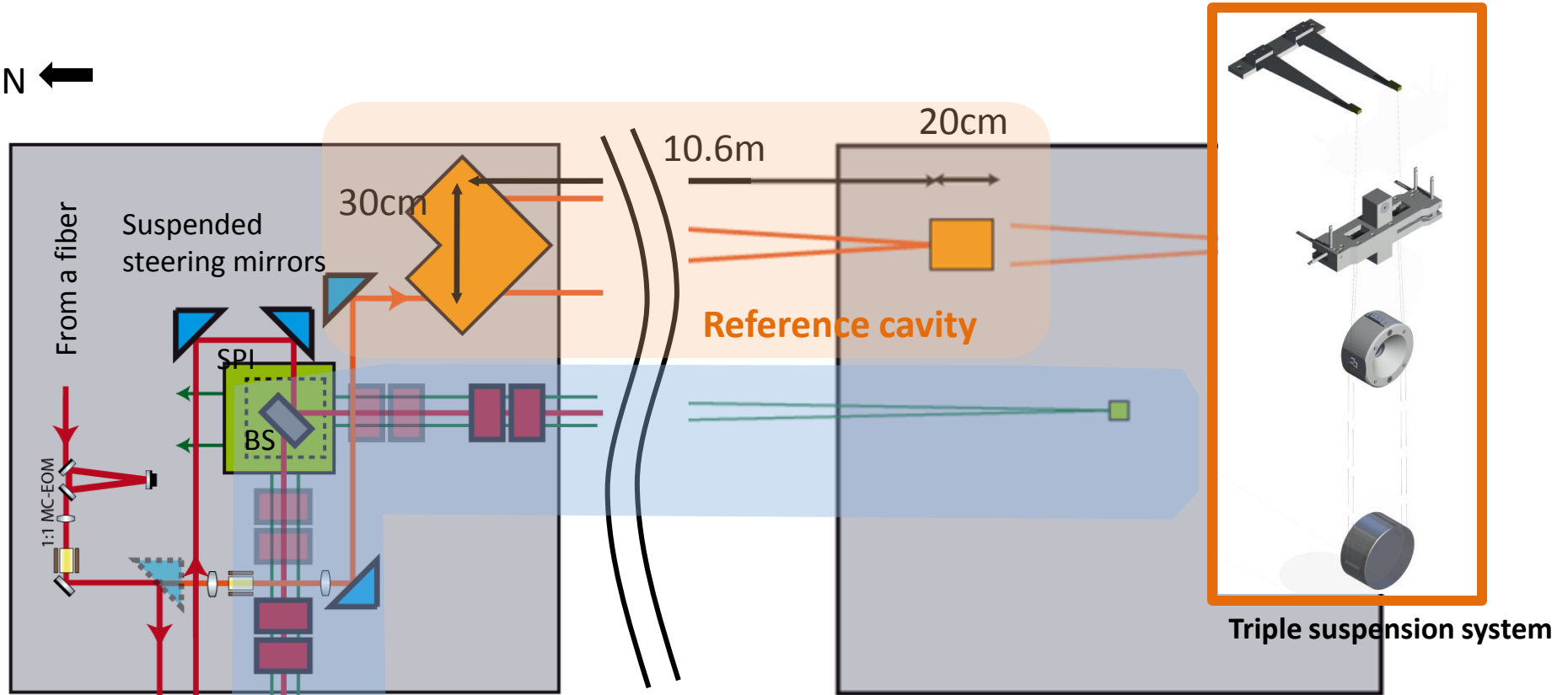
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**GEO-ISC meeting**

**27. Jan. 2010**

# The AEI-10m frequency reference cavity

N ←



To mode-matching mirrors

Sub SQL

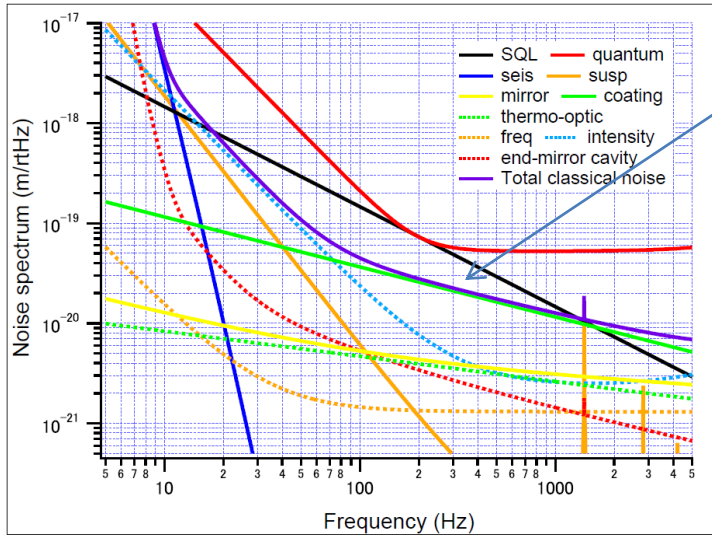
Collimated beam

Round trip length	21.2 m
Input power	130 mW
Finesse	7300
Higher-order special mode suppression	$< 10^4$
g factor	0.72
Beam waist size	2.4 mm

Triple suspension system

# The requirement

## Sub-SQL sensitivity



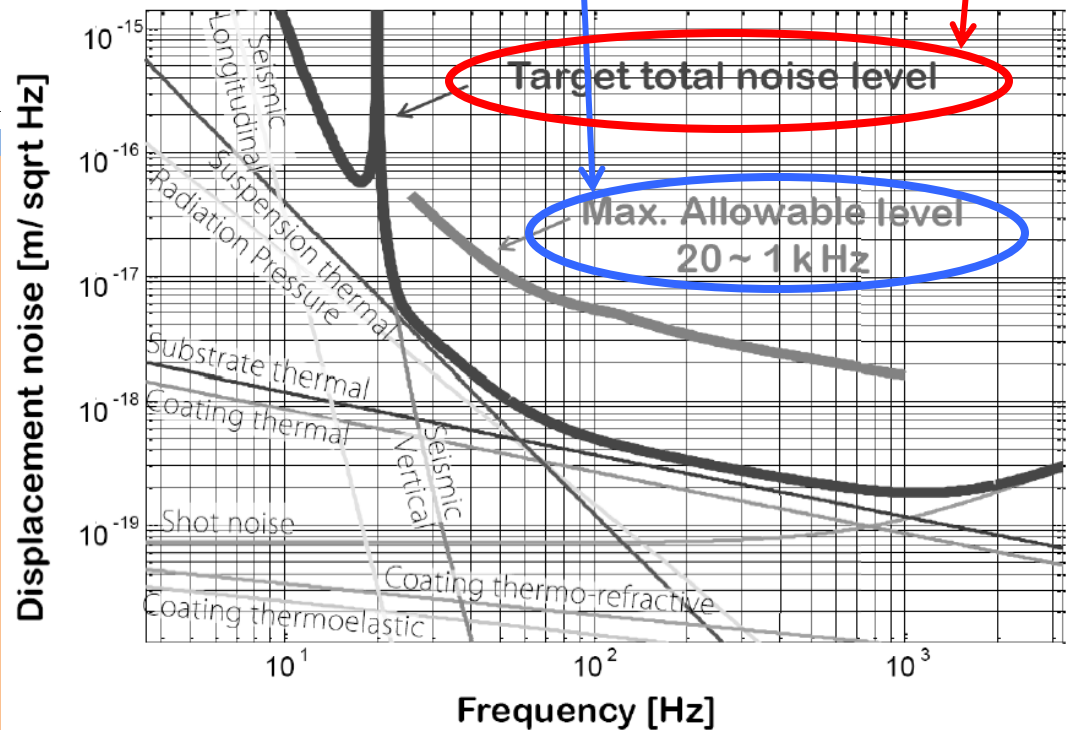
Total classical noise on sub SQL

> Frequency noise on Sub SQL

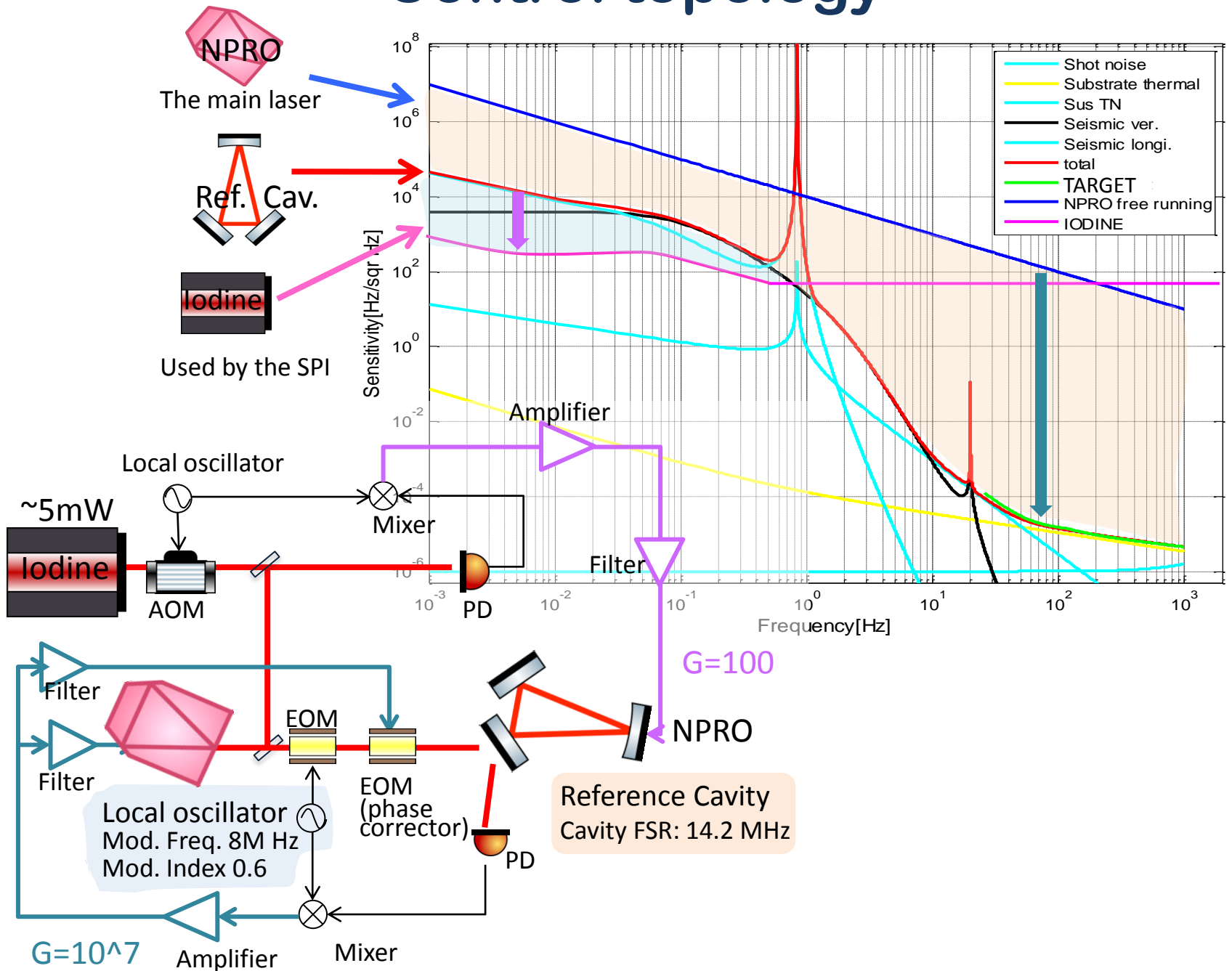
Common-mode rejection ratio (1%)

Safety factor 10

## Reference cavity sensitivity



# Control topology



# Auto-alignment control

- Motivation
  - For better sensitivity performance
- Current status
  - Conceptual design
  - Simulation work
  - Requirement calculation

