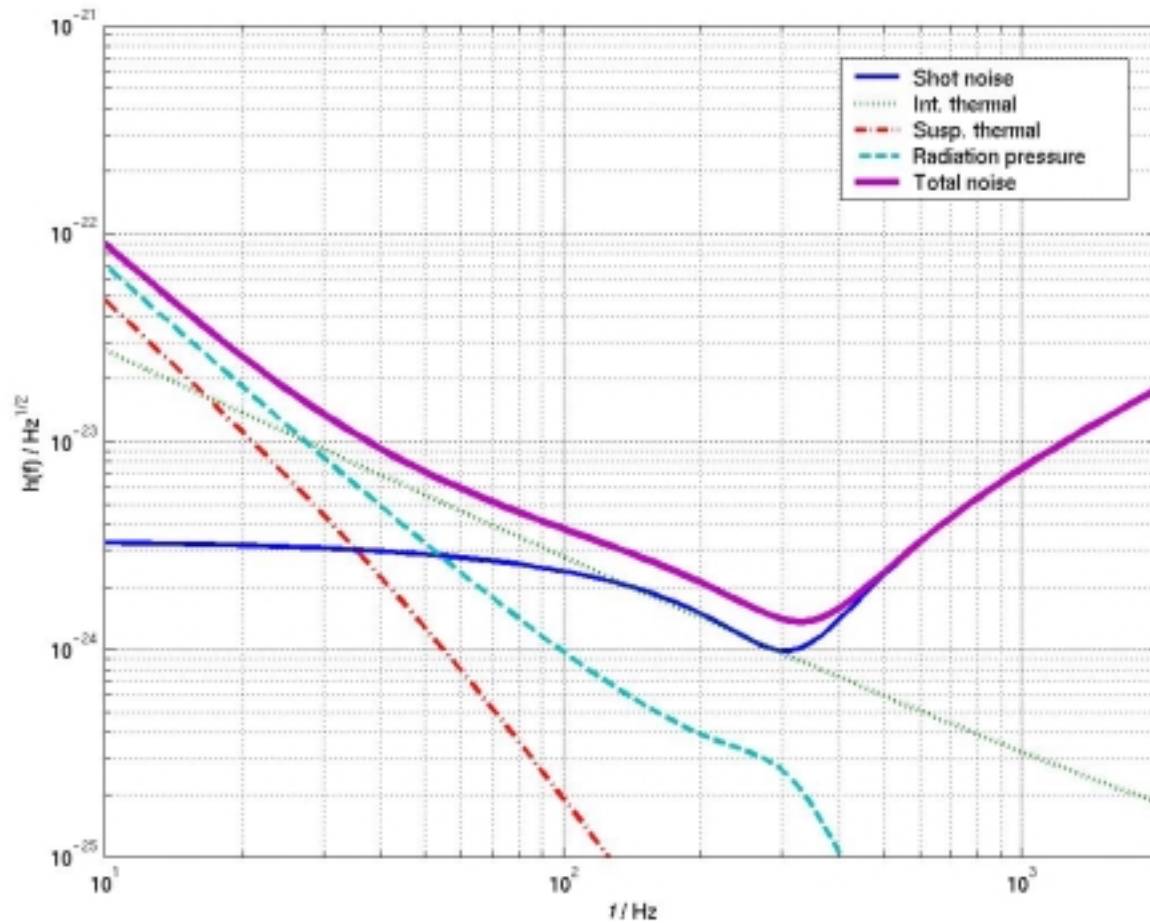


# SWG Discussion of Thermal Noise Issues

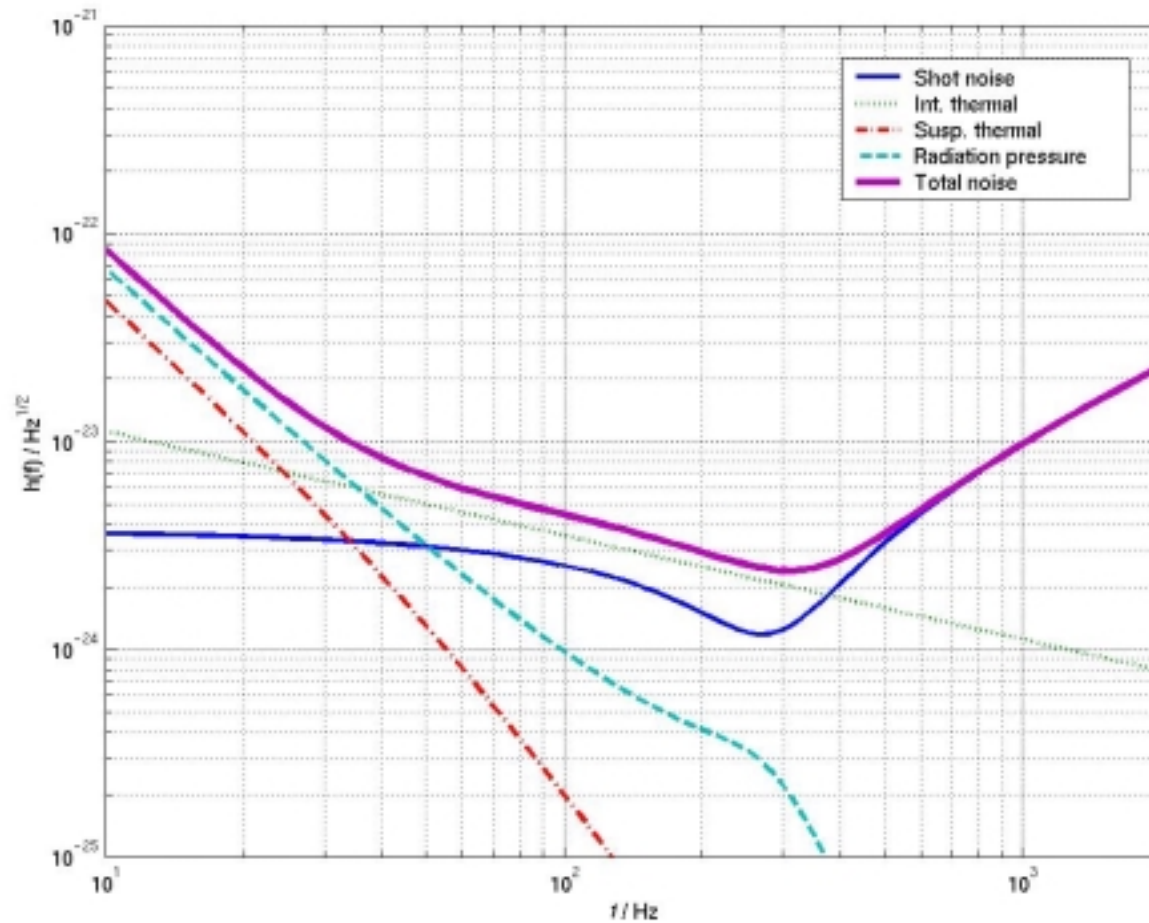
Peter Saulson

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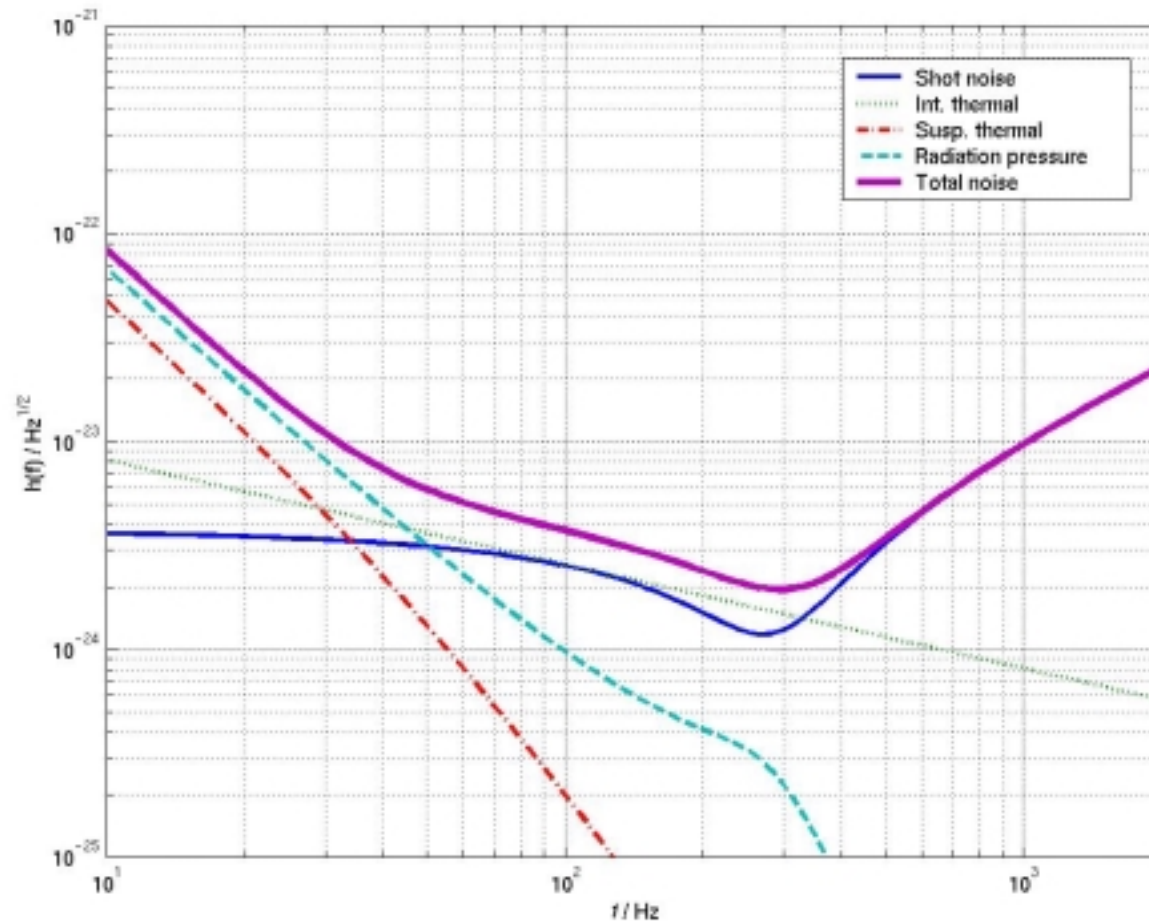
# Sapphire default NSB range = 202 Mpc



# Silica default NSB range = 166 Mpc



# Silica, $Q=57$ million NSB range = 193 Mpc



# Do we know all of the relevant noise mechanisms?

- Do we know all of the dissipation mechanisms for thermal noise?
- Do we know all of the other relevant noise mechanisms?
- What can be learned about “dirt” effects (non-Gaussian noise)?

# Can we reach this noise level?

Thermal noise curves drawn from best numbers measured in specialized expt's.

Outstanding questions in

- materials
- part fabrication
- suspension assembly
- actuators

Excess noise as well!

# Materials Questions

Where do we stand in our knowledge of materials properties of

- sapphire?
- silica?

What research is still needed?

# Fabrication questions

Where do we stand in our knowledge of fabrication procedures (and the consequences thereof) for

- ribbons?
- mirror blanks (grinding and polishing)?
- coatings?

What research is still needed?



# Assembly questions

Where do we stand in our knowledge of assembly techniques regarding

- ribbon twist?
- hydroxy catalysis bonding?
- “less critical” bonding?
- interface to rest of SUS/SEI

# Actuator questions

Where do we stand in our knowledge of actuator design?

- Electrostatic actuator

What about charging?

# Excess noise

## Possibility of excess noise in

- highly stressed ribbon/fiber
- contacts (esp. where rubbing is allowed)
- variable work functions
- charging events

Do we need to modify  
the SWG research plan?

Are there important topics not covered in our  
plan?

Should priorities change?