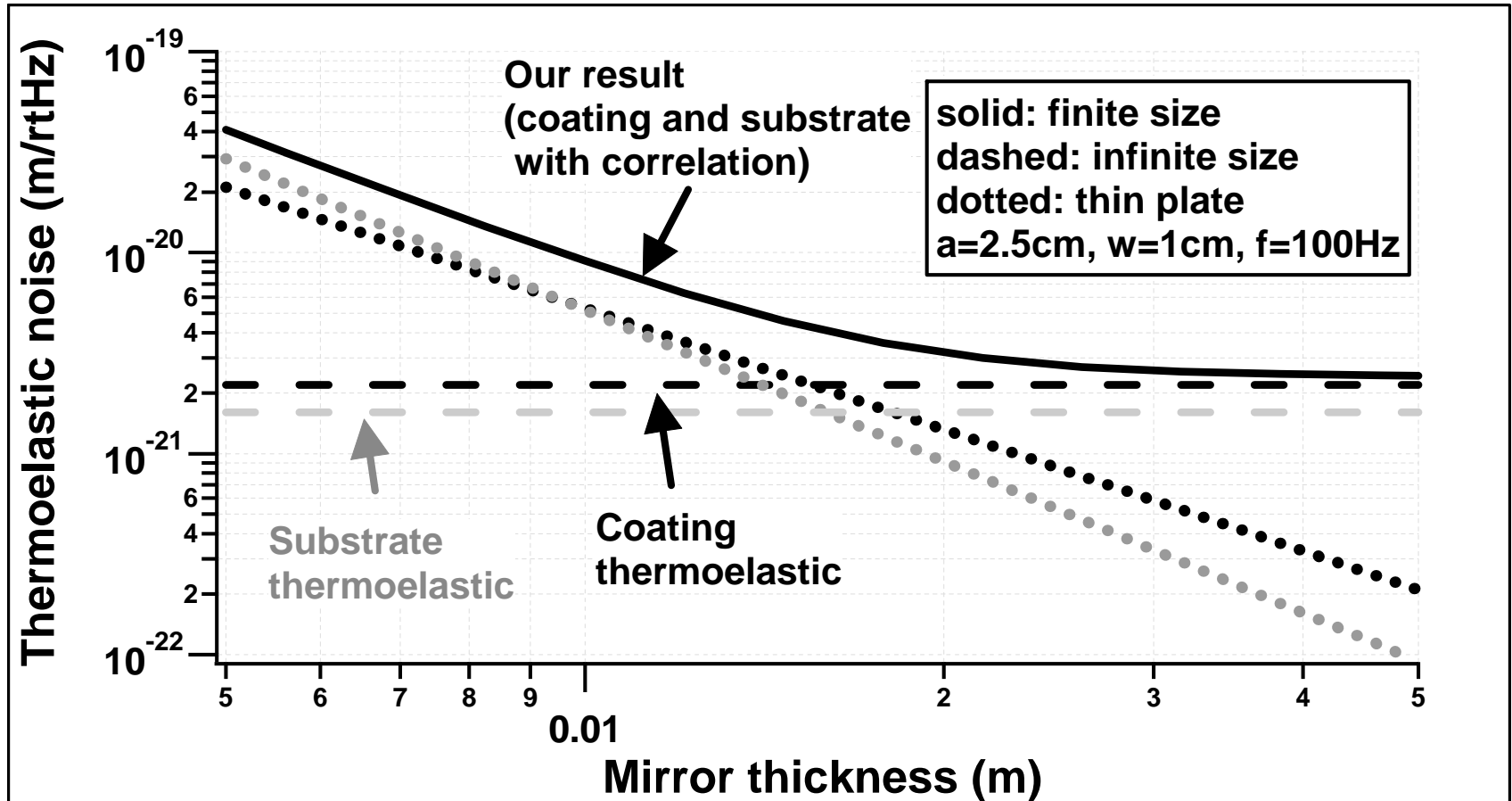
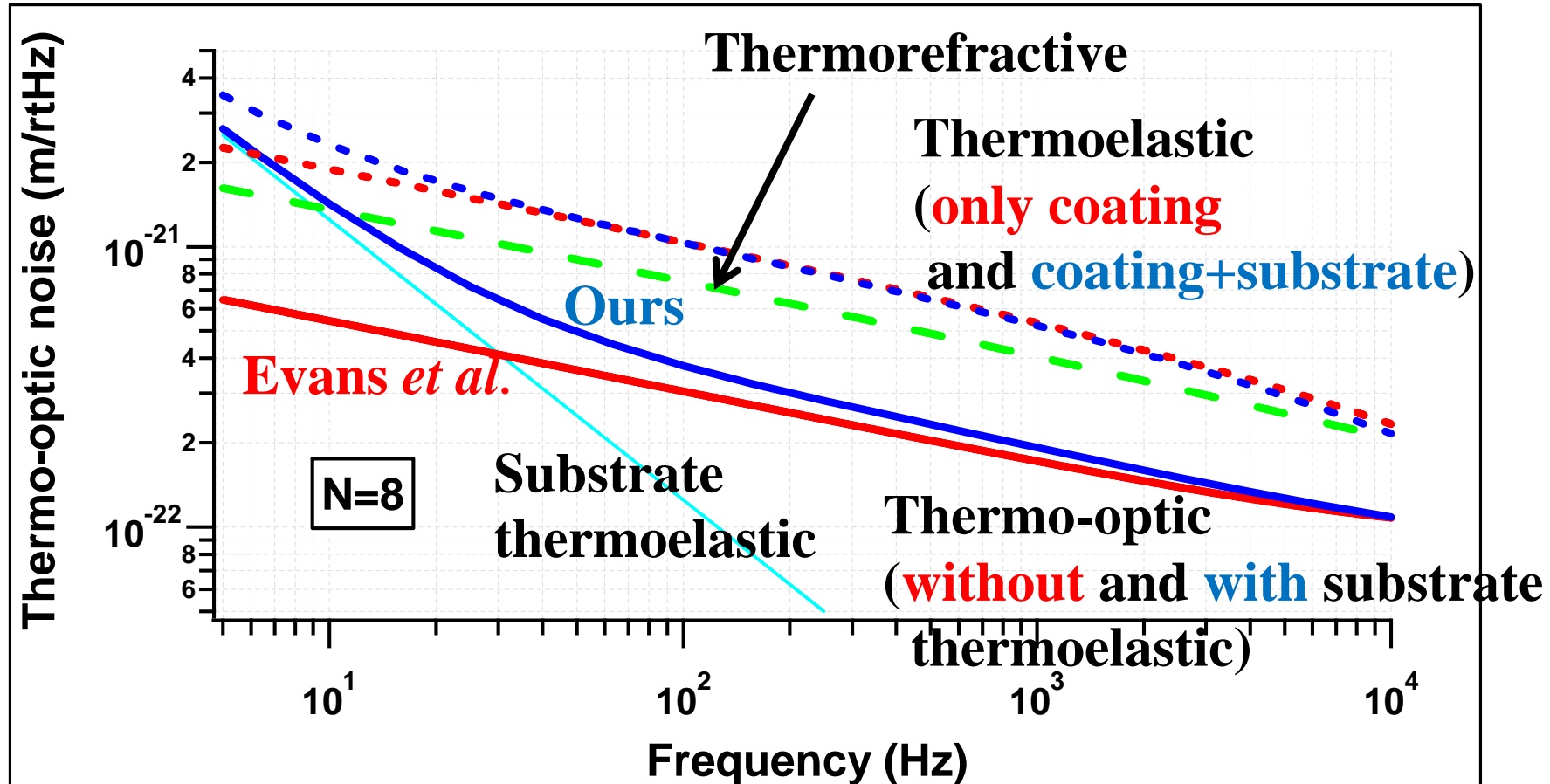


4-3. Thermoelastic noise (substrate and coating) at 100 Hz



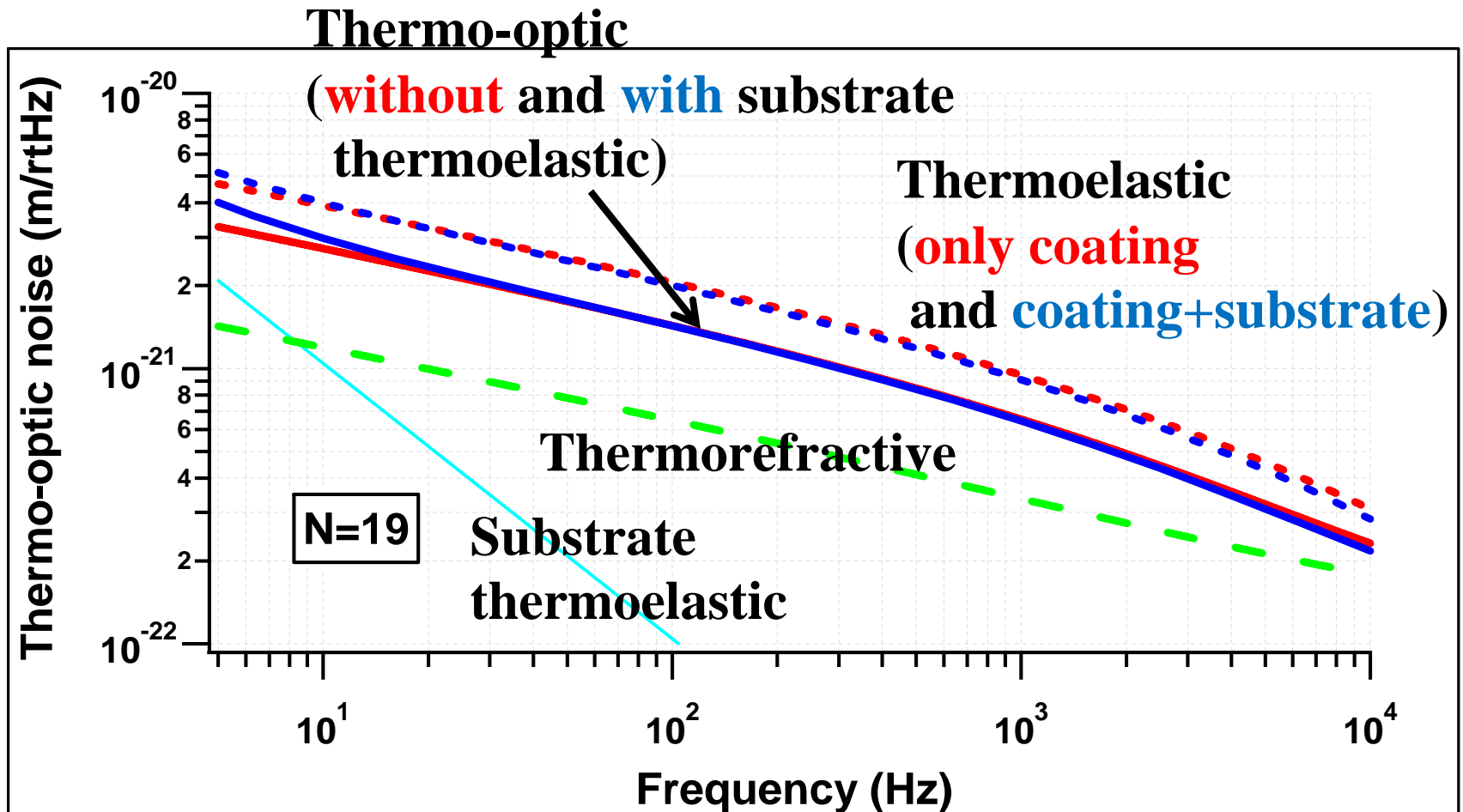
Our result includes **substrate** thermoelastic noise and **correlation** (between substrate and coating thermoelastic noise).

4-4. Thermo-optic noise with substrate thermoelastic noise (advanced LIGO front mirror)



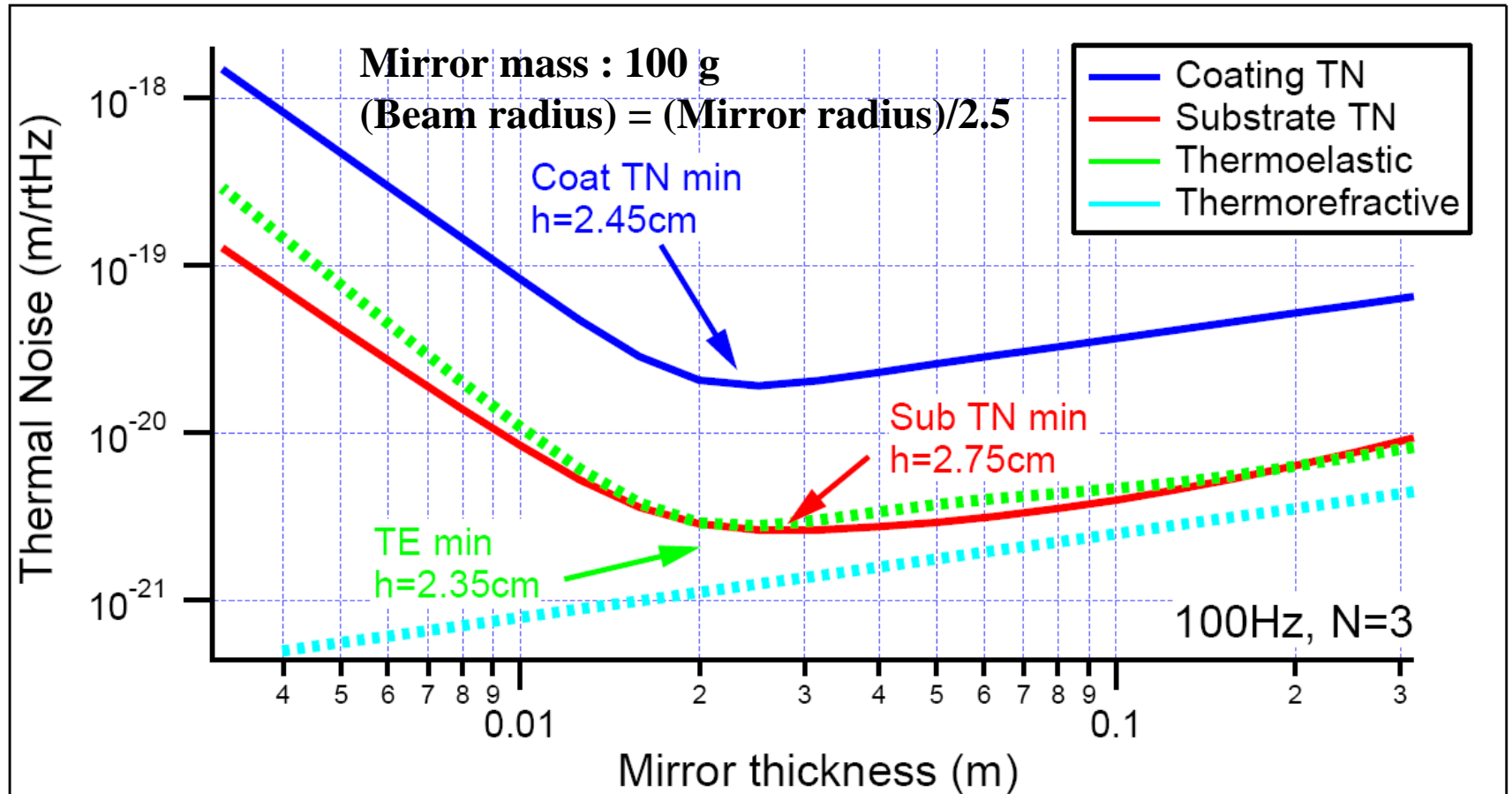
Small thermo-optic noise (thermoelastic and thermorefractive noises cancel each other well).
Our result (thermo-optic) includes **substrate** thermoelastic noise.

4-5. Thermo-optic noise with substrate thermoelastic noise (advanced LIGO end mirror)



Coating thermoelastic noise is **larger** than thermorefractive noise because of **thick coating**. Thermo-optic noise is **larger**.

4-6. Optimum mirror for quantum optics experiment (10m prototype, Hannover, Germany)

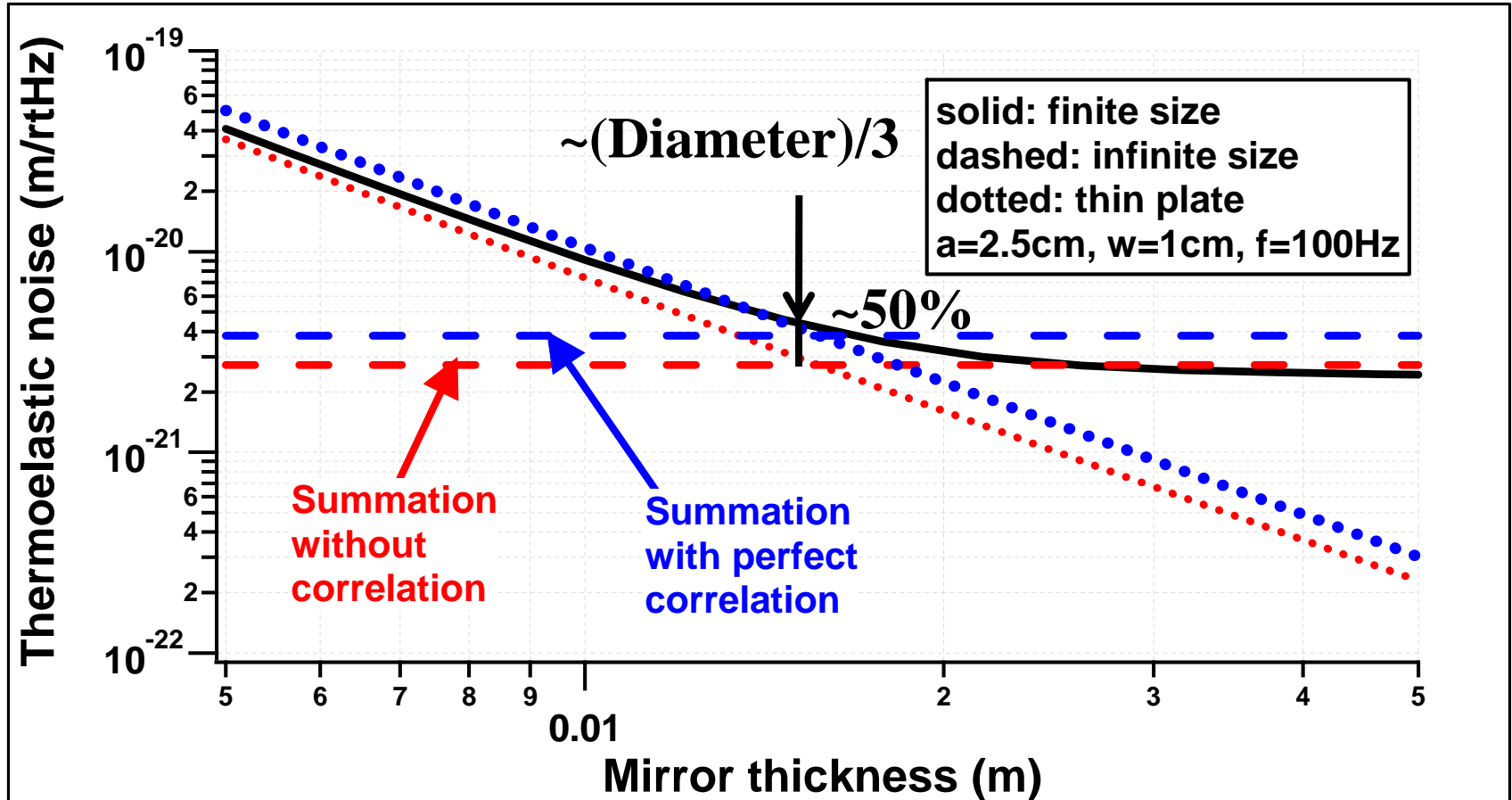


**Thickness of optimum mirror is a half of the diameter.
(~4.8 cm)**

5. *Summary*

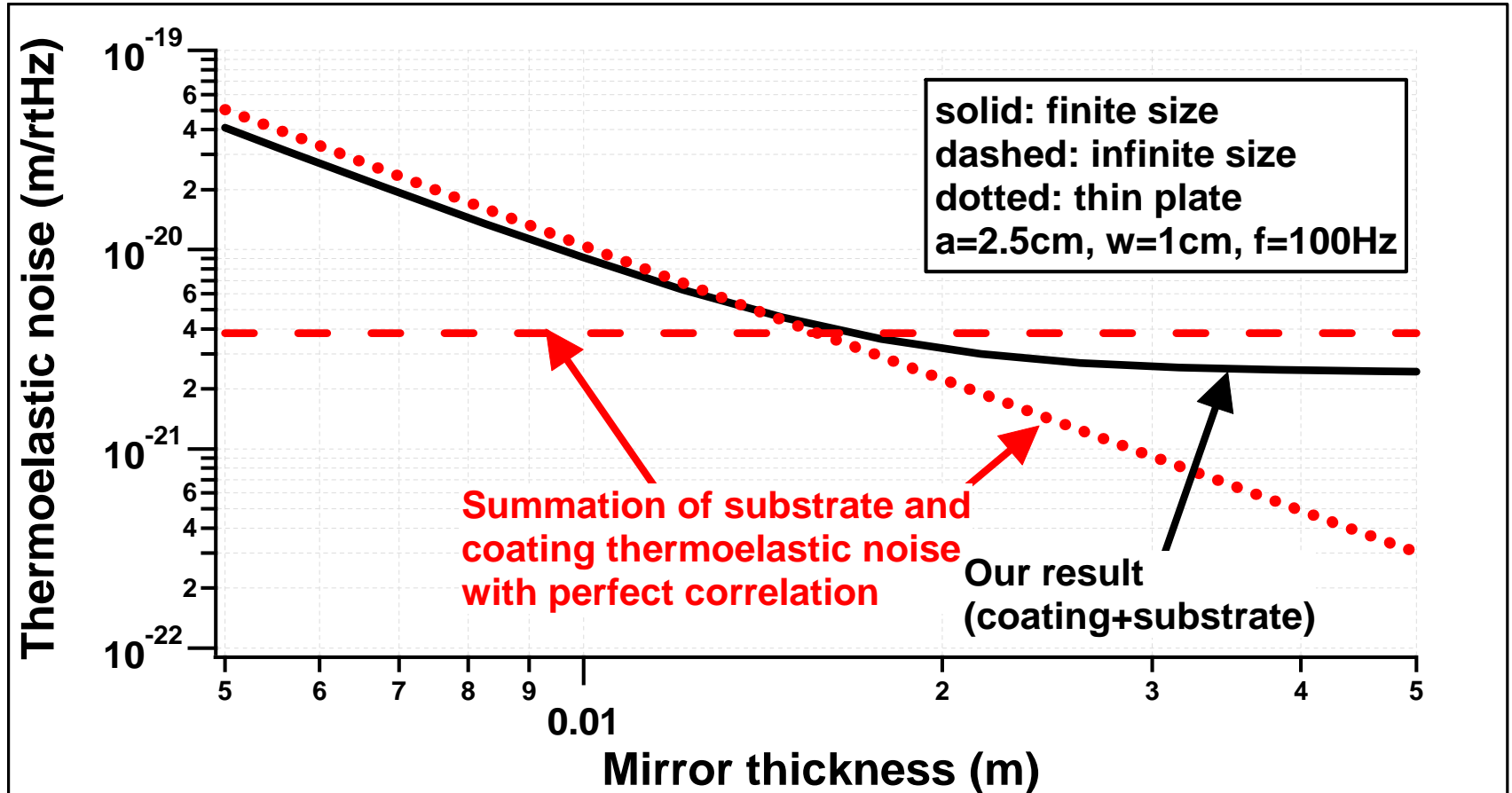
- (1) We calculated thermal noise of **finite** cylindrical mirror and **summation of substrate and coating thermoelastic noise and thremorefractive noise with their correlations.**
- (2) Our results **agree with half-infinite** and **thin plate** approximation formulae.
Half infinite approximation : (Thickness) > (Diameter)/3
Thin plate approximation : (Thickness) < (Diameter)/3
- (3) **Optimum** specification of mirror for **quantum optics** experiment
(Thickness) ~ (Diameter) /2

4-3. Thermoelastic noise (substrate and coating) at 100 Hz



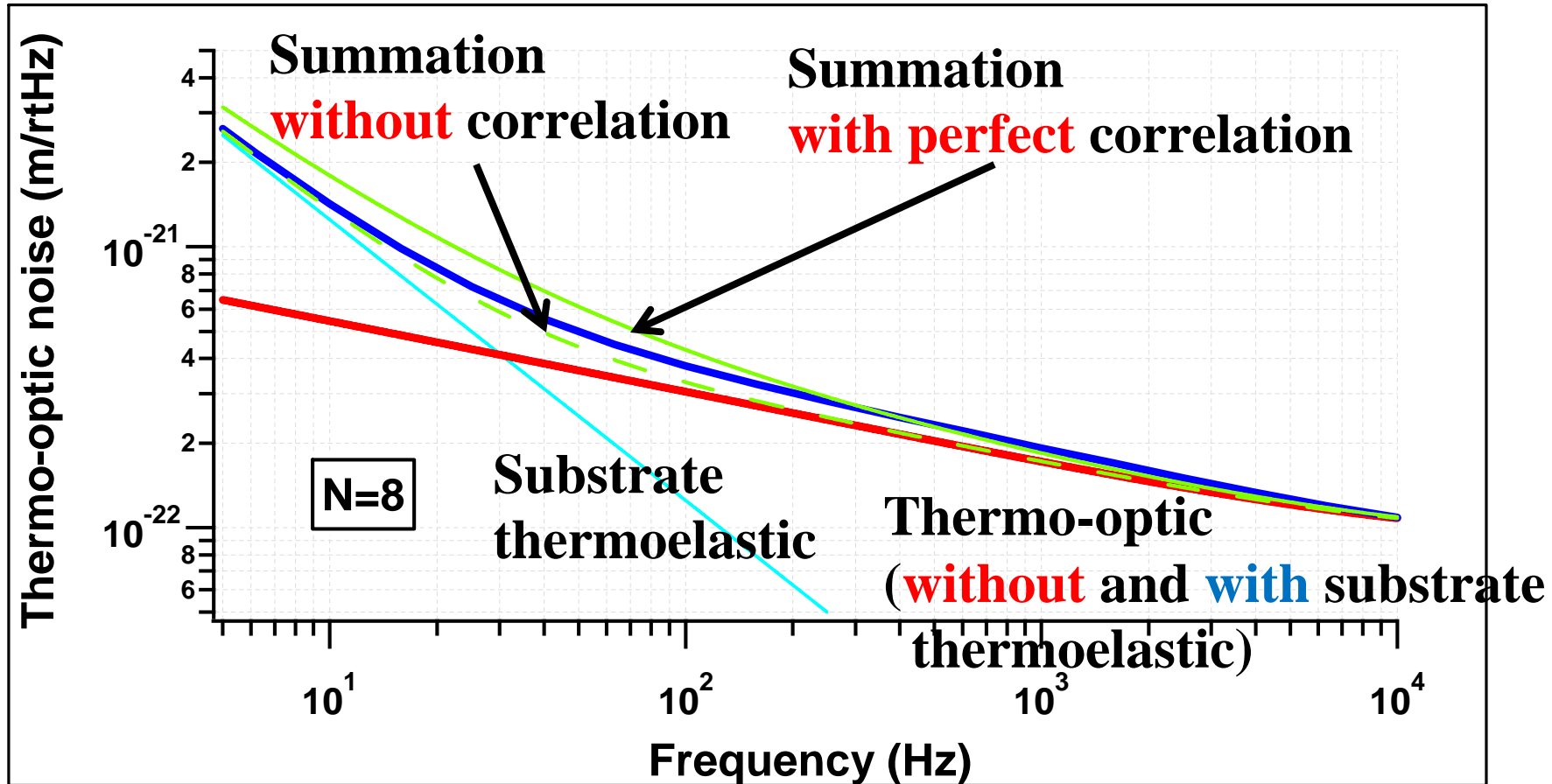
Correlation is not so strong.

4-3. Thermoelastic noise (substrate and coating) at 100 Hz



Our result is below summation with perfect correlation.

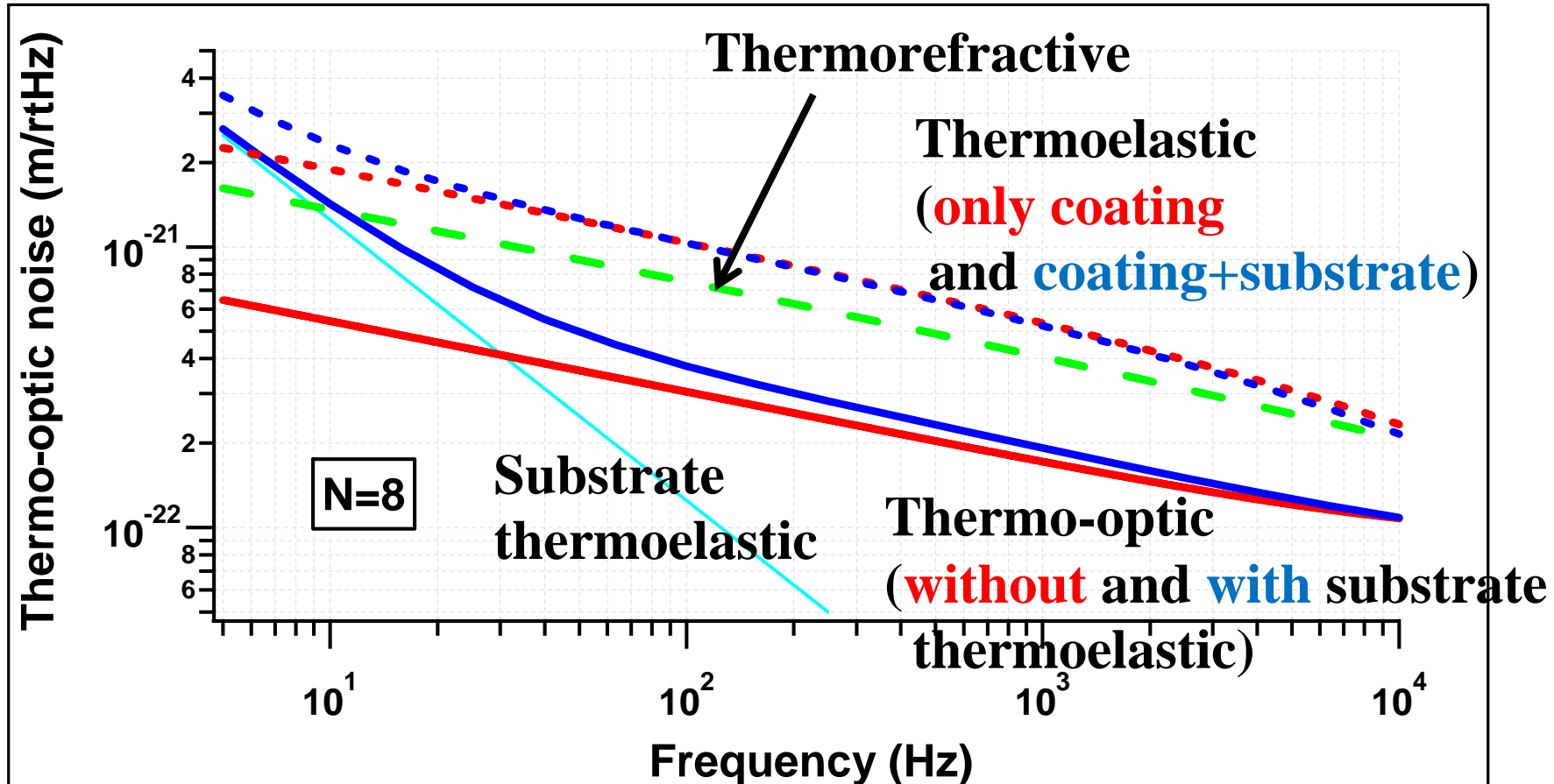
4-4. Thermo-optic noise with substrate thermoelastic noise (advanced LIGO front mirror)



Small thermo-optic noise (thermoelastic and thermorefractive noises cancel each other well).

Correlation is not so strong.

4-4. Thermo-optic noise with substrate thermoelastic noise (advanced LIGO front mirror)



Small thermo-optic noise (thermoelastic and thermorefractive noises cancel each other well).

Our result includes **substrate** thermoelastic noise.