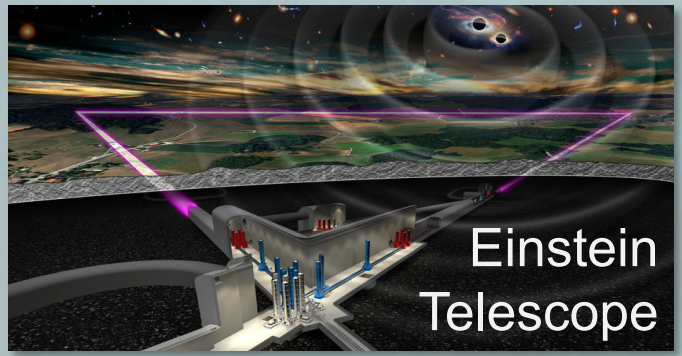
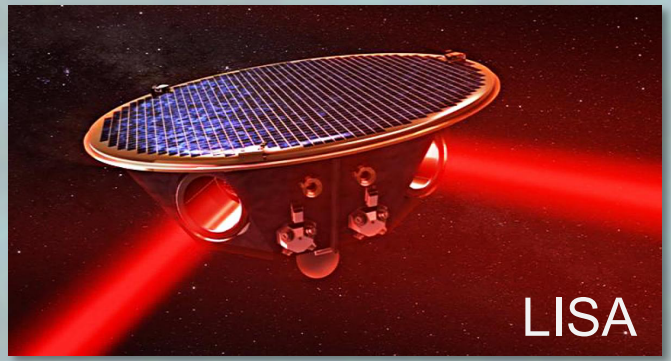
Gravitational Wave Physics & Engineering @ KU Leuven

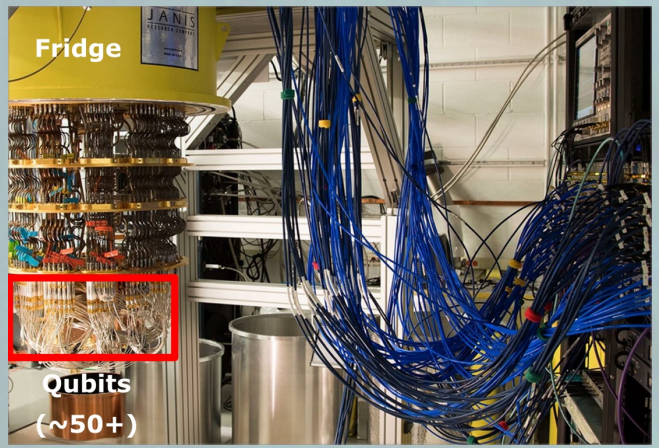
Thomas Hertog

Institute for Theoretical Physics

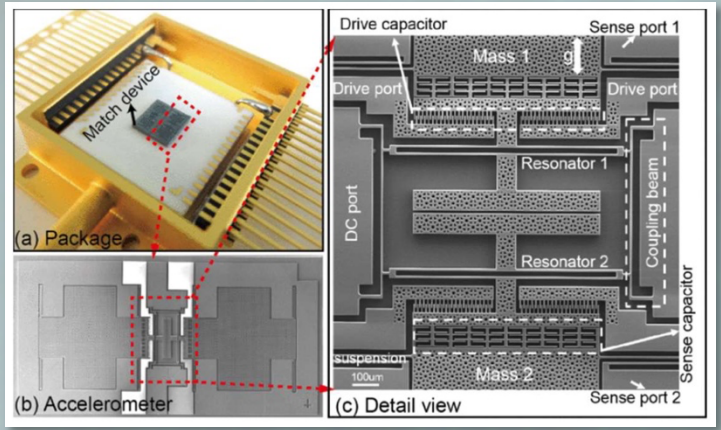




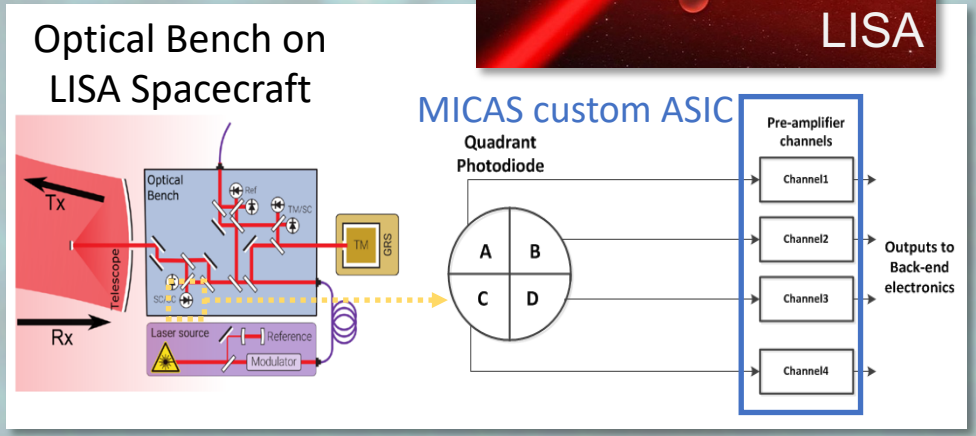
- Prof. Filip Tavernier
- Alberto Gatti
- Ciana Barretto → later today



MICAS: *Chip design for extreme environments*



Einstein Telescope: MEMS accelerometers with novel **Cryogenic CMOS** signal conditioning integrated circuits (e.g. for low-temperature vibration control)

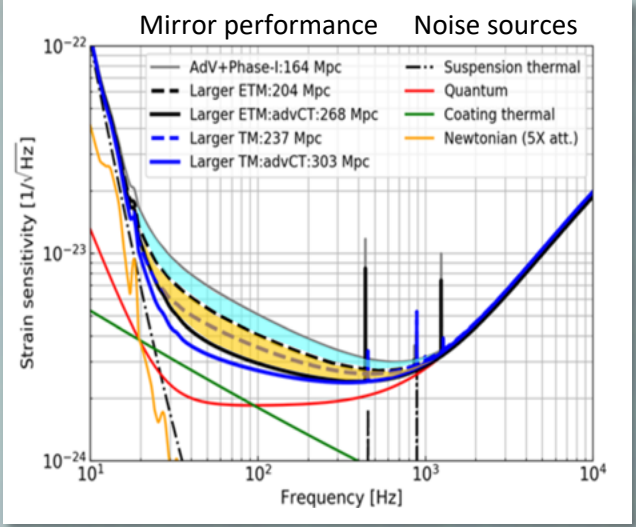


Advantages of custom-designed chips in low-temperature (ET) or high-radiation (LISA) environments:

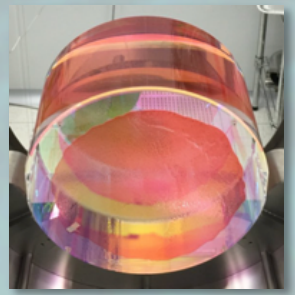
- Integration
- Signal integrity
- Low power

- Prof. Jean-Pierre Locquet

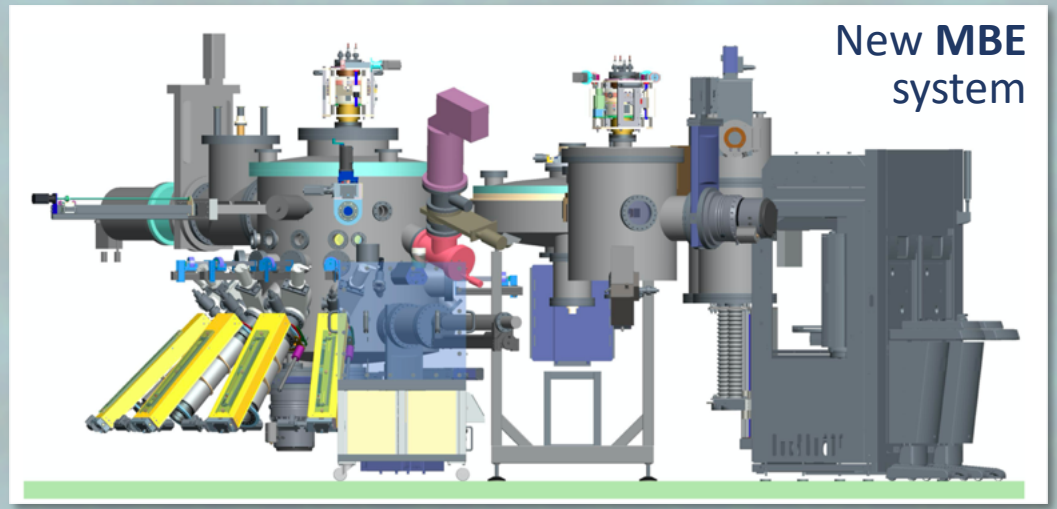
Semiconductor Physics: *Low-noise mirror coatings*



Coating thermal noise has large contribution to mirror performance!



- Noise of state-of-the-art **amorphous** coatings is major performance limitation for GW detectors
- Our goal: high quality **single crystal** oxide mirror coatings



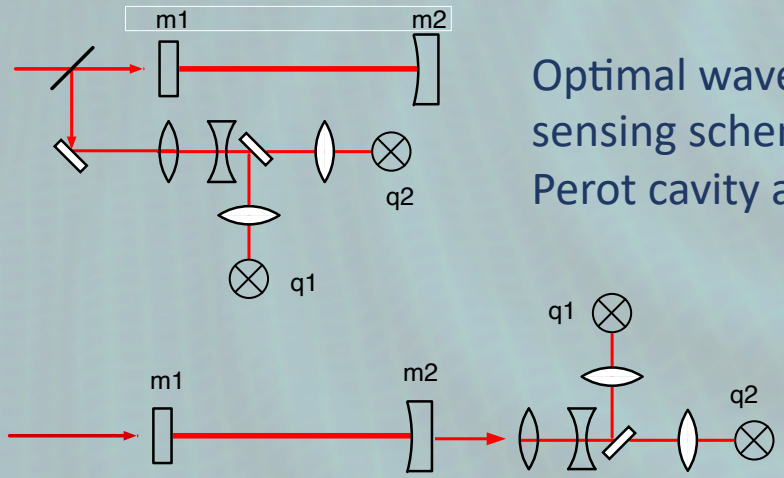
Interreg Euregio Meuse-Rhine
E-TEST
EUROPEAN UNION
European Regional Development Fund

ETpathfinder

- Dr Gert Raskin
- Dr Bart Vandenbussche
- Prof. Hugues Sana
- Prof. Gijs Nelemans

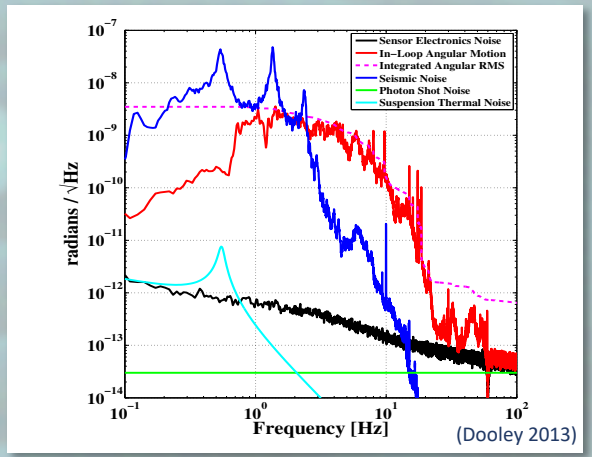
Institute of Astronomy: *Interferometer optical design and control*

Designing an optimal control system for aligning the interferometer mirrors of ***ETpathfinder*** …

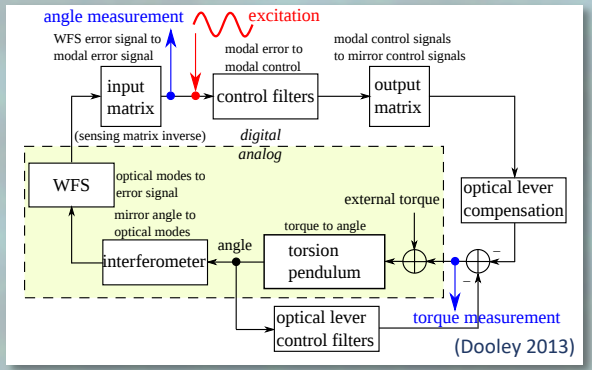


Optimal wavefront sensing scheme for Fabry-Perot cavity alignment

Alignment sensor noise budget



Mirror angular control servo



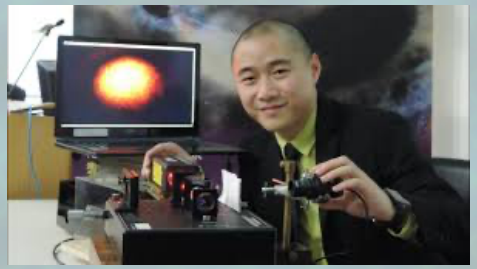
ETpathfinder

KU LEUVEN

INSTITUTE FOR THEORETICAL PHYSICS

- Prof. Thomas Hertog
- Prof. Bert Vercnocke
- Dr. Pablo Cano
- Kwinten Fransen
- Lorenzo Kuechler (w/ ULB)
- Ludovico Machet (w/ ULB)

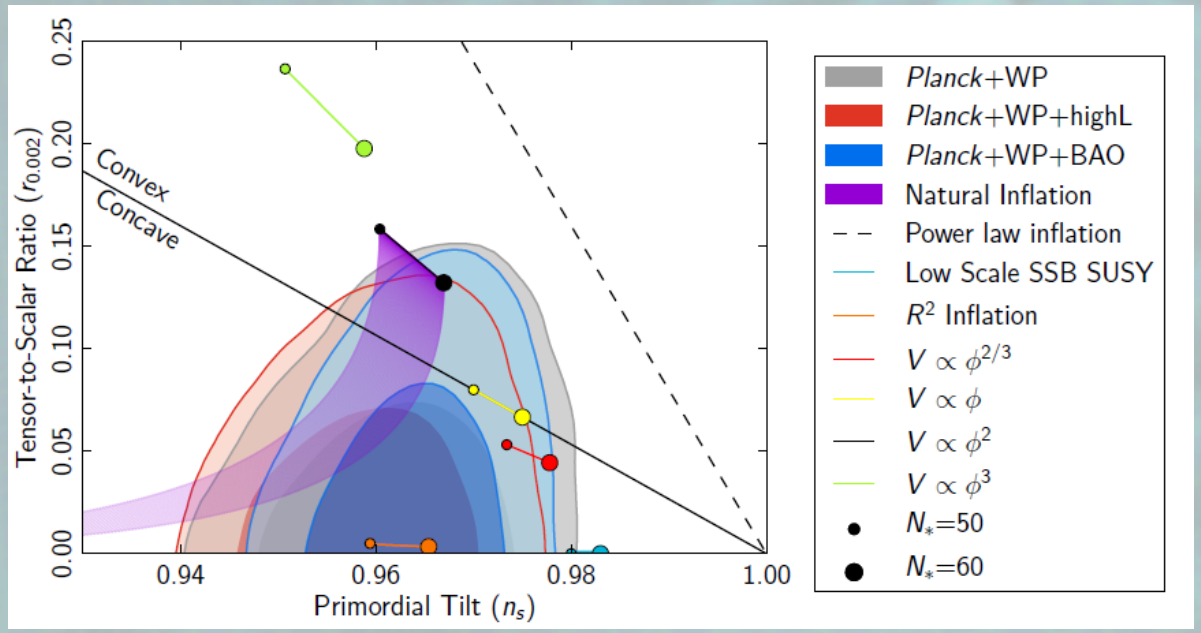
- **October 2021:** Tjonnie Li



STADIUS
Center for Dynamical Systems, Signal Processing and Data Analytics

Institute for Theoretical Physics: *Testing (extensions of) GR*

e.g. primordial gravitational waves from inflation



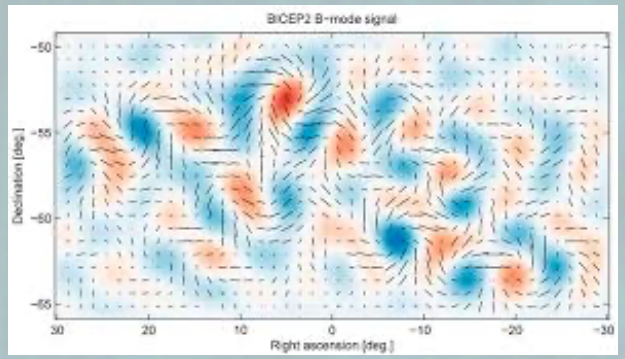
Planck: r < 0.07

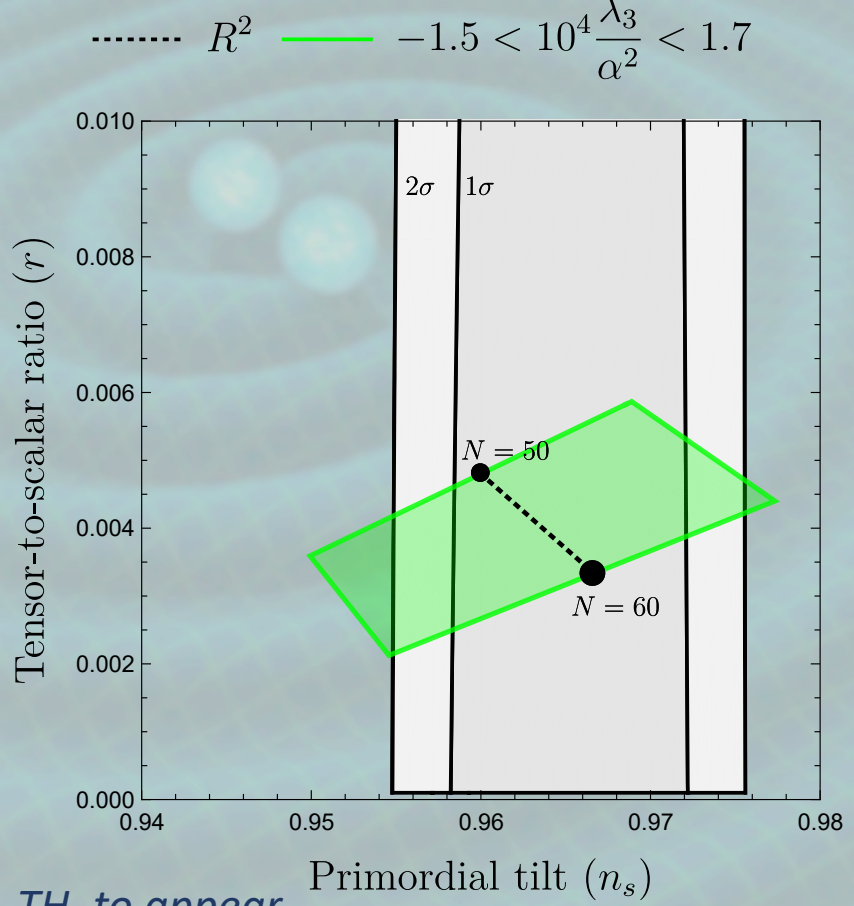
R^2 inflation theoretically and observationally appealing → open up phenomenology

Institute for Theoretical Physics: *Testing (extensions of) GR*

Gravitational waves from inflation

→ LiteBIRD !





Cano, Fransen, TH, to appear