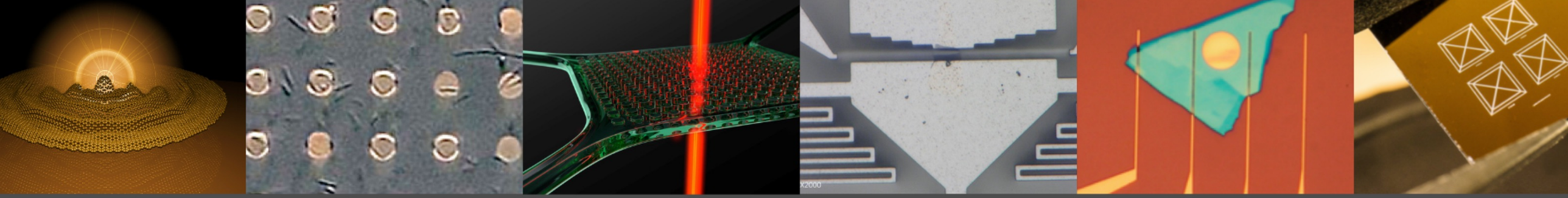


FNS / 2023

Frontiers of Nanomechanical Systems

TU Delft

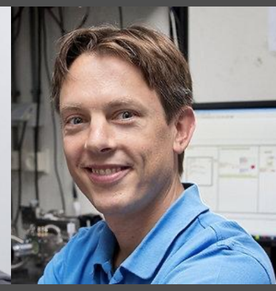
6 - 9 June 2023

WELCOME

Conference chairs

Farbod Alijani

Herre Van der Zant



Peter Steeneken

SiTime · SFB 1432 · TU Delft · Oxford Instruments · Zurich Instruments · KLA Instruments · Intermodulation products · lyncée tec — TIME-RESOLVED 3D OPTICAL PROFILOMETERY

CONFERENCE TOPICS

Fundamental research on vibrations of nanomechanical systems

- Quantum resonators
- Nonlinear dynamics
- Phase, symmetry and topology
- Fluctuations and dissipation
- Sensing and control
- Phonons, solitons, and excitons

FNS2023 includes 38 talks and 100 poster presentations

Previous FNS conferences

Bi-annual conference intending to stimulate international interactions in the rapidly growing field of micro and nanomechanical resonators

The “Frontiers of Nanomechanical Systems (FNS)” conference

Feb. 05 - 10, 2017

La Thuile,Italy · Italy

Palm Springs, California, USA

FNS

FNS 2021

FRONTIERS OF NANOMECHANICAL SYSTEMS

ONLINE, 19-21 JAN 2021

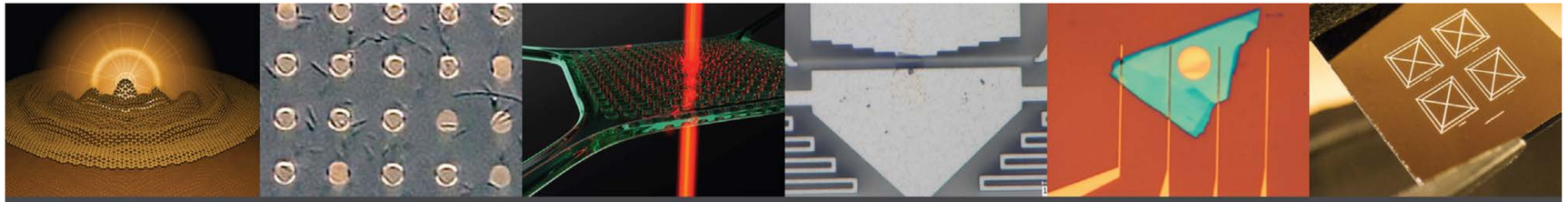
The workshop series Frontiers of Nanomechanical Systems serve to bring together the international research community engaged in fundamental research on micro- and nano- electromechanical systems (MEMS & NEMS).

CONFERENCE VENUE

ART CENTRE DELFT

ROTTERDAMSEWEG 205
2629 HD DELFT
THE NETHERLANDS

	weer	min/max	neerslag	wind	cijfer
Maandag 5 jun		10°/20°	0 mm	4	10
Dinsdag 6 jun		9°/21°	0 mm	4	9
Woensdag 7 jun		10°/20°	0 mm	4	8
Donderdag 8 jun		10°/22°	0 mm	4	9
Vrijdag 9 jun		11°/24°	0 mm	3	9
Zaterdag 10 jun		13°/26°	0 mm	3	9



FNS / 2023

DELFT SCIENCE IN HISTORY

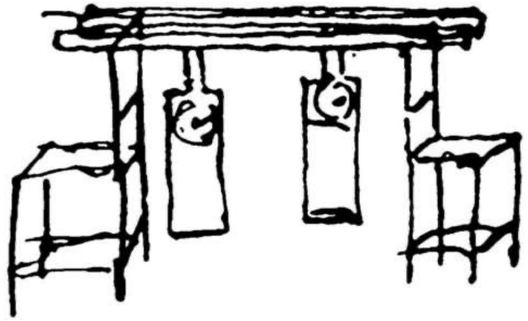
CHRISTIAAN HUYGENS : 1629-1696

BUILT FIRST PENDULUM

$$T \approx 2\pi\sqrt{\frac{L}{g}}$$

Published in 1673,
350 years ago

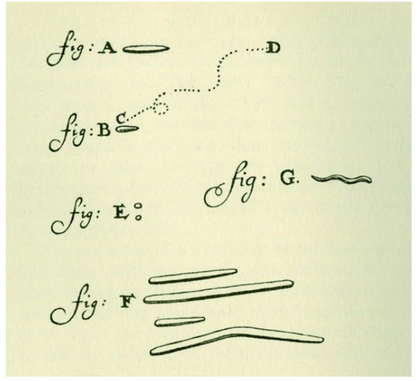
DISCOVERY SYNCHRONIZATION



ANTHONIE VAN LEEUWENHOEK : 1632-1723

DISCOVERY BACTERIA

MICROSCOPE OF LEEUWENHOEK



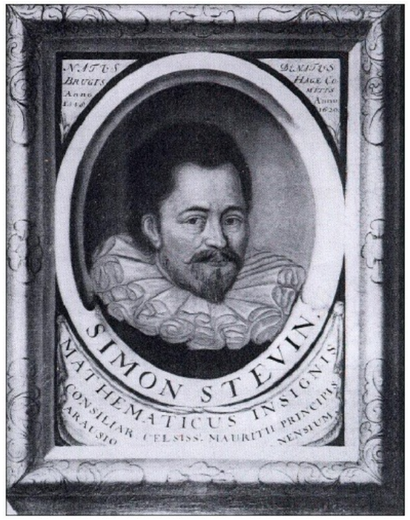
Published in 1673,
350 years ago

https://en.wikipedia.org/wiki/1673_in_science

SIMON STEVIN: 1548-1620

DELFT TOWER EXPERIMENT

Published 1586



https://en.wikipedia.org/wiki/Delft_tower_experiment

CONFERENCE VENUE

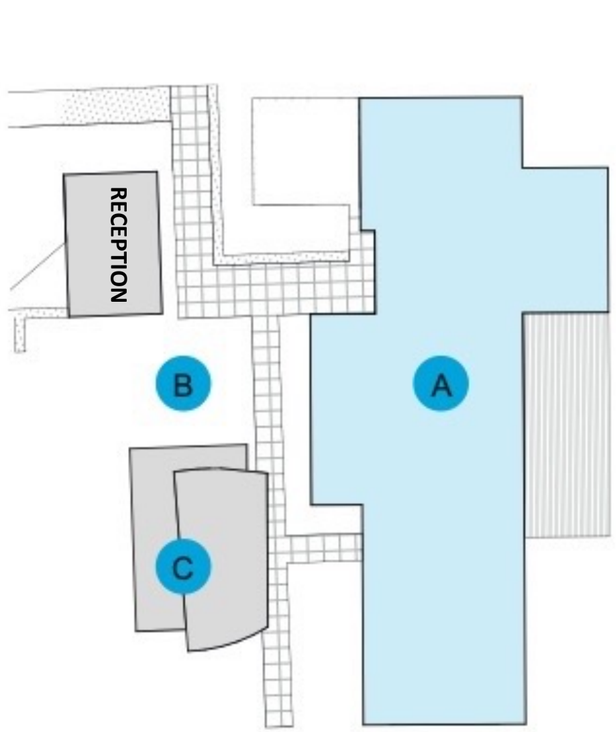
Art Centre Delft

Rotterdamseweg 205
2629 HD Delft

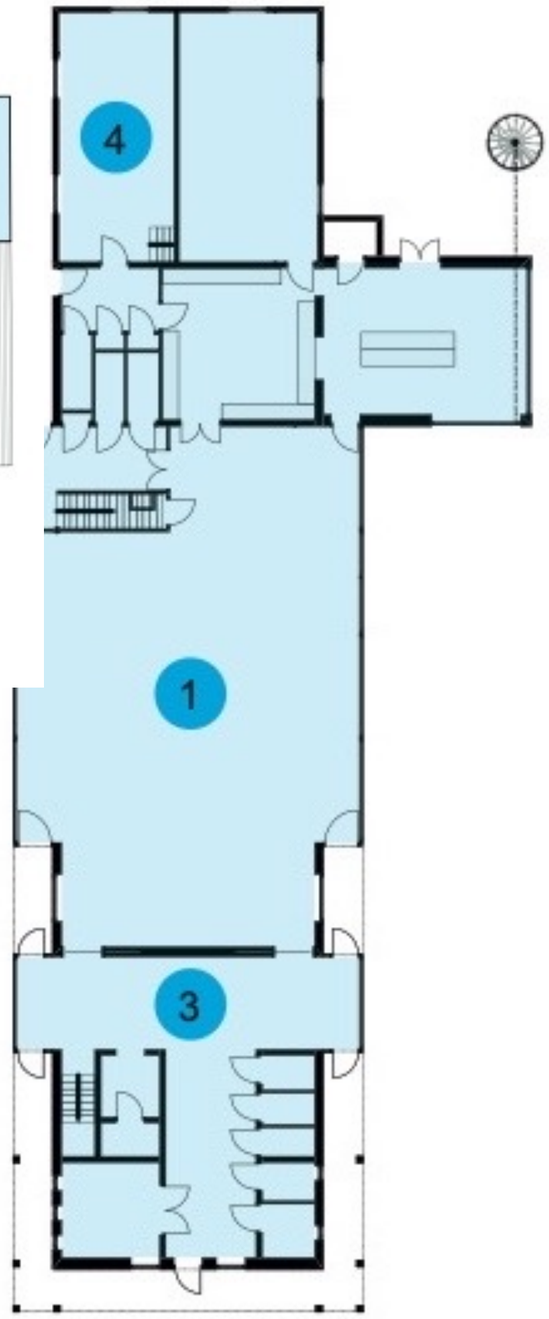
Plenary sessions:
The Plenary Sessions will take place in the Main building, Ground floor 'gallerie'

The Poster sessions:
Will be held in two places. First floor of the main building and the Lunch area/ Garden pavilion

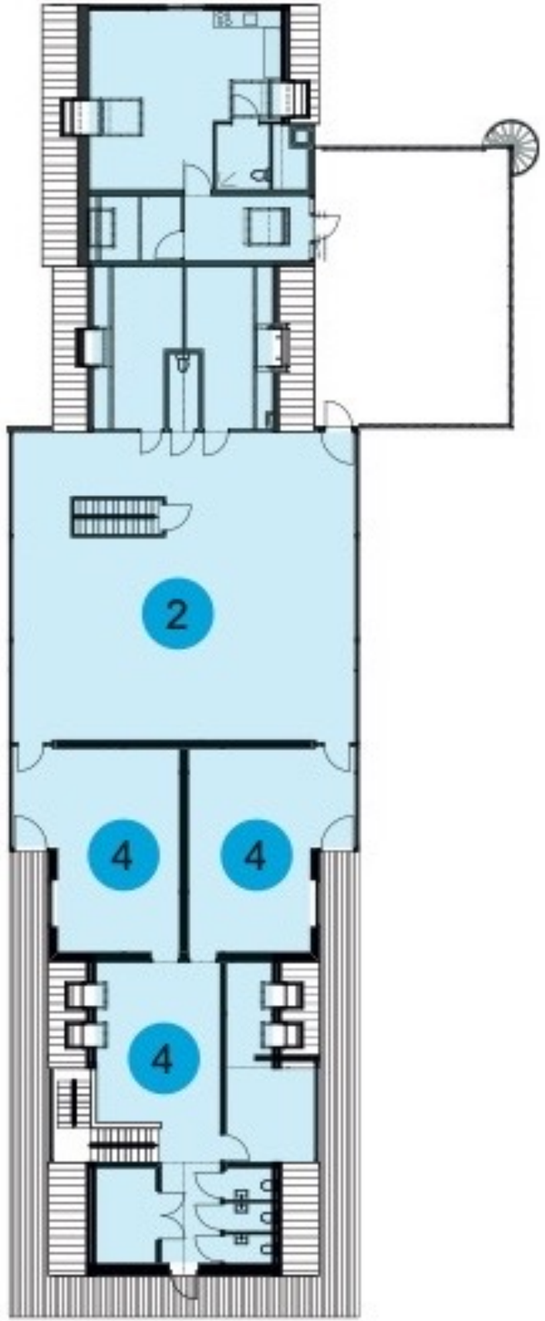
3 poster awards to be announced on Friday June 9



Ground floor



First floor



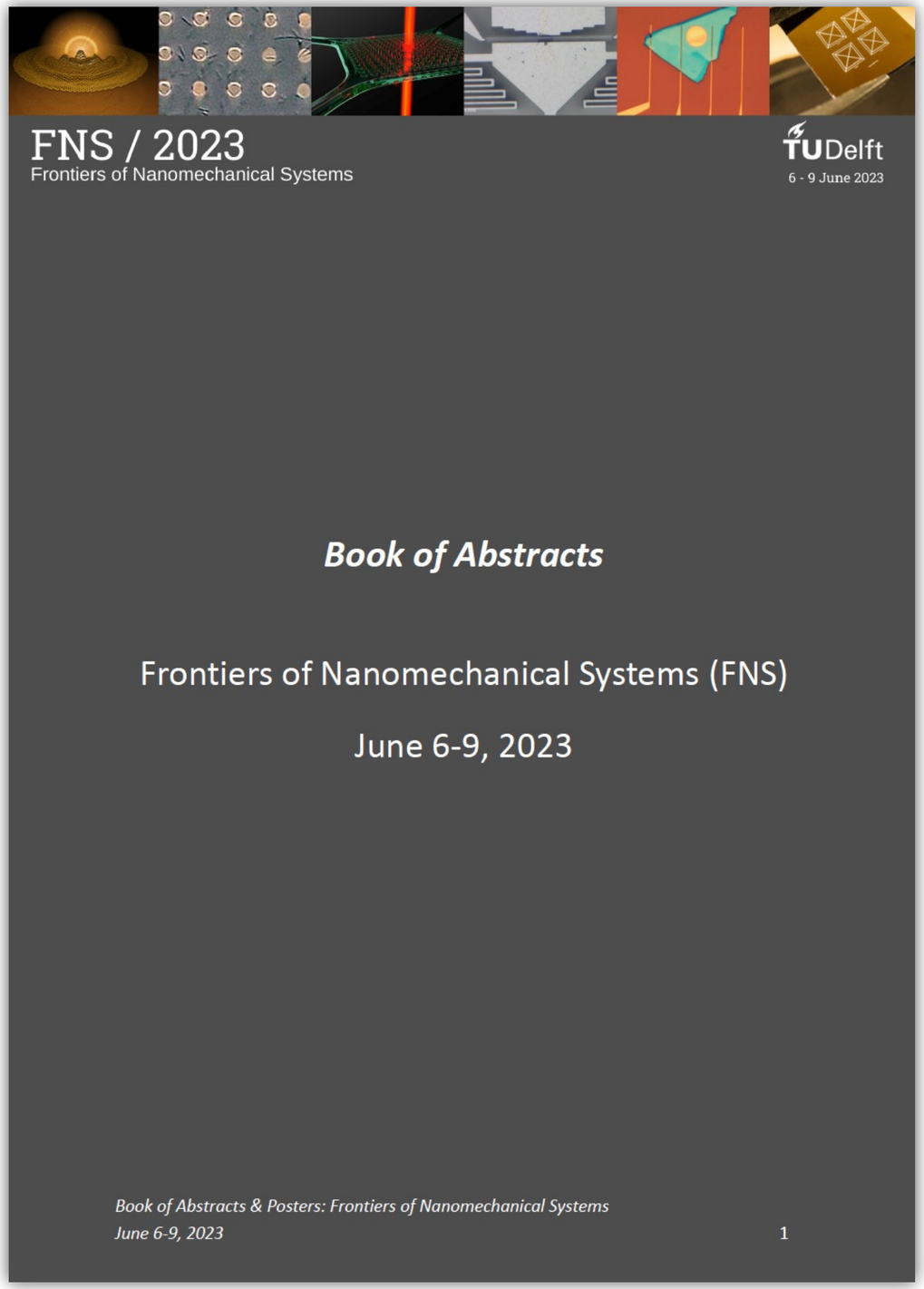
1 Plenary room
2 Posters
3 Sponsors
4 Meeting area

A Main building
B Coffee breaks
C Lunch/posters

CONFERENCE INFORMATION

- Book of abstracts as well as the detailed program can be downloaded from the website: www.fns2023.nl
- Attendees who have rented a bike, will receive their bikes on June 6th noon (cycle carefully!)

Wifi Art Centre: ACD guests



CONFERENCE PROGRAM

Quantum resonators (9 talks)	Phase, symmetry, and topology (5 talks)	Nonlinear dynamics (6 talks)	Fluctuations and dissipation (4 talks)	Sensing and control(6 talks)	Phonons, solitons, and excitons (8 talks)

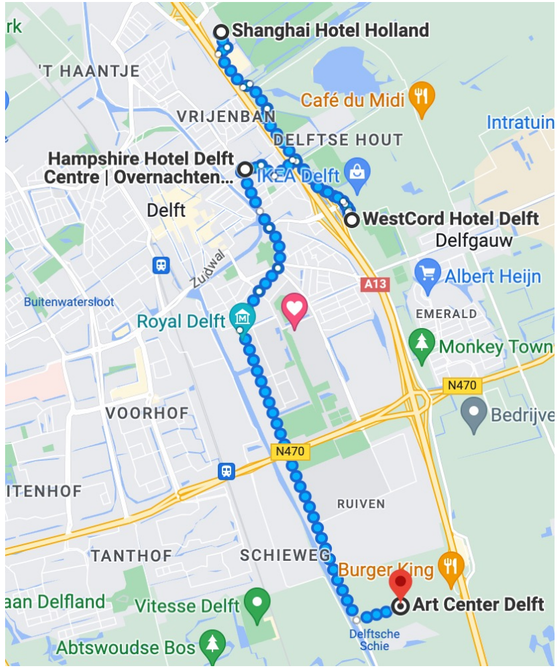
Tuesday June 6, 2023		
8:15-9:00	Registration & coffee	
9:00-9:15	Welcome words	Local organizers
9:15-9:50	*Topological solitons in the arrays of nanomechanical parametric resonators* Hiroshi Yamaguchi (NTT, Japan)	Chair: Herre van der Zant
9:55-10:30	*In-equilibrium thermodynamics of a mesoscopic mechanical object:towards the quantum ground-state* Eddy Collin (Grenoble, France)	
10:30-11:00	Coffee break	
11:00-11:25	*Boosting the nonlinearity of mechanical resonators approaching the quantum regime* Adrian Bachtold (ICFO, Spain)	Chair: Eva Weig
11:30-11:55	*Emergent phenomena in driven nonlinear quantum resonators* Gary Steele (TUD, Netherlands)	
12:00-12:15	Sponsor pitch	
12:20-13:20	Lunch	
13:20-13:55	*Quantum state preparation and tomography of entangled mechanical resonators* Amir Safavi-Naeini (Stanford, USA)	Chair: Simon Gröblacher
14:00-14:35	*Topologically-imposed vacancies and mobile solid 3He on carbon nanotube nanomechanical resonator* Pertti Hakonen (Aalto, Finland)	
14:40-15:15	*Optomechanical meta-matter: Nonreciprocity and topology in synthetic nanomechanical networks* Ewold Verhagen (AMOLF, Netherlands)	
15:15-15:45	Coffee break	
15:45-16:10	*Nonlinear dynamics and fluctuations in micronscale membrane resonators* Elke Scheer (University of Konstanz, Germany)	Chair: Daniel Lopez
16:15-16:40	*Cavity acousto-mechanics: A platform for linear and nonlinear dynamics* Samer Houri (IMEC, Belgium)	
17:00-19:00	Poster presentations & welcome reception	
19:00	Bus transport	

Thursday June 8, 2023		
8:15-8:30	Welcome coffee	
8:30-8:55	*Phononic waveguides as coherent phonon sources* Clivia Sotomayor Torres (ICN2, Spain)	Chair: Peter Steeneken
9:00-9:25	*Controlling excitons in strained 2D semiconductors* Kiril Bolotin (Freie University Berlin, Germany)	
9:30-9:55	*Tension tuning of sound and heat transport in graphene* Gerard Verbiest (TUD, Netherlands)	
9:55-10:25	Coffee break	
10:25-11:00	*Controlled dynamics of a levitated nanoparticle in a hybrid optical/RF integrated trapping platform* Romain Quidant (ETH, Switzerland)	Chair: Kamil Ekinci
11:05-11:30	*Kinetic-inductive mechano-electric coupling* David Haviland (KTH, Sweden)	
11:35-12:00	*Cavity optomechanical liquid prober using a twin-microbottle resonator* Motoki Asano (NTT, Japan)	
12:05-12:25	Sponsor pitches	
12:30- 13:30	Lunch	
13:30-14:05	*Period-tripled oscillations in electromechanical resonators* Ho Bun Chan (HKUST, China)	Chair: Adrian Bachtold
14:10-14:45	*Magneto-mechanics and nonlinear dynamics of 2D antiferromagnetic membranes* Makar Šiškins (NUS, Singapore)	
14:45-15:15	Coffee break	
15:15-15:50	*Building nanoscale engines with fully suspended carbon nanotubes* Natalia Ares (University of Oxford, UK)	Chair: Raphael St-Gelais
15:55-16:20	*Detection of Brownian motion via a quantum dot coupled to a highly miniaturized mechanical resonator* Clemens Spinnler (Basel, Switzerland)	
17:00	Bus transport from Art Centre to Madurodam	
18-19:30	Madurodam park visit & welcome drinks	
19:30- 21:30	Dinner	
21:30	Bus transport	

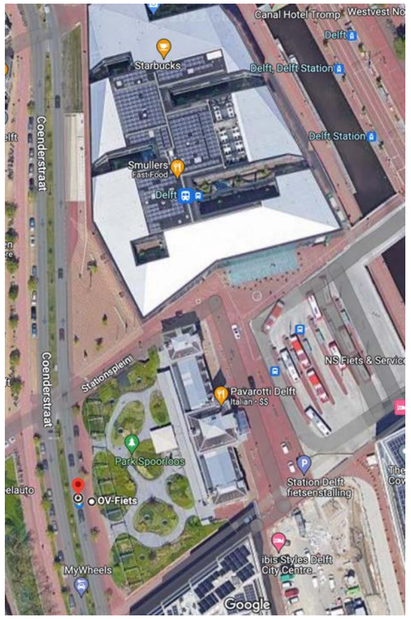
Wednesday June 7, 2023		
8:15- 8:30	Welcome coffee	
8:30-8:55	*Ultralow dissipation mechanical resonators for quantum optomechanics* Amirali Arabmoheghi(EPFL, Switzerland)	Chair: Yaroslav Blanter
9:00-9:25	*Nanomechanical qubit and non-linearities* Fabio Pistolesi (Université de Bordeaux, France)	
9:30-9:55	*Coherent feedback cooling of a nanomechanical membrane with atomic spins* Gianluca Schmid (Basel, Switzerland)	
9:55-10:25	Coffee break	
10:25-11:00	*Phonon engineering of TLS defects in superconducting quantum circuits* Oskar Painter (Caltech, USA)	Chair: Albert Schliesser
11:05-11:30	*Optomechanical interactions enriched by excited carriers* Ivan Favero (Université de Paris, France)	
11:35-12:00	*Surface acoustic wave transduction of nanomechanical pillar resonators* Silvan Schmid (TU Wien, Austria)	
12:05-12:25	Sponsor pitches	
12:30- 13:30	Lunch	
13:30-14:05	*Transient time symmetry breaking in driven oscillators* Mark Dykman (Michigan State University, USA)	Chair: Fabio Pistolesi
14:10-14:45	*Phase transitions & exotic states in an array of driven nonlinear quantum oscillators:insights from an exact solution* Aash Clerk (University of Chicago, USA)	
14:45-15:15	Coffee break	
15:15-15:50	*Optomechanical scanning force microscopy with high-Q resonators* Alex Eichler (ETH, Switzerland)	Chair: Ho Bun Chan
15:55-16:20	*Measuring radiation torque shot noise and full potential control of a levitated nano-dumbbell* Fons van der Laan (AMOLF, Netherlands)	
16:25-16:50	*Nanomechanical resonator frequency measurement and fundamental lower limits of frequency uncertainty* Vladimir Aksyuk (NIST, USA)	
17:00-19:00	Poster presentations & drinks	
19:00	Bus transport	

Friday June 9, 2023		
8:45-9:00	Welcome coffee	
9:00-9:25	*Engineering the speedup of quantum tunneling via dissipation* Gianluca Rastelli (University of Trento, Italy)	Chair: Clivia Sotomayor Torres
9:30-9:55	*Thermal fluctuations of a nanomechanical beam resonator in a viscous fluid* Kamil Ekinci (Boston University, USA)	
10-10:30	Coffee break	
10:35-11:00	*Inducing micromechanical motion by optical excitation of a single quantum dot* Pierre Verlot (Université Paris-Saclay, France)	Chair: Hiroshi Yamaguchi
11:05-11:40	*Quantum control of phononic membrane resonators: from milikelvin to room tempereature* Albert Schliesser (Copenhagen University, Denmark)	
11:45-12:10	Sponsor pitches	
12:15-13:15	Lunch	
13:15-13:50	*High-Q spiderweb nanomechanics inspired by machine learning* Richard Norte (TUD, Netherlands)	Chair: Robert Blick
13:55-14:20	*Relaxation and dynamics of predisplaced silicon nitride strings* Menno Poot (TUM, Germany)	
14:20-14:50	Coffee break	
14:50-15:15	*Spontaneous parametric down-conversion in MEMS micro mirrors* Peter Degenfeld-Schonburg (Bosch GmbH, Germany)	Chair: Silvan Schmid
15:20-15:55	*Can a single nanomechanical mode generate a frequency comb?* Eva Weig (TUM, Germany)	
16:00-16:30	Closing words & poster awards	Local organizers & FNS committee
17:00	Bus transport	

TRANSPORT TO/FROM VENUE



- Coach 1 morning transport
  - 07.45 hrs. Shanghai hotel
  - 07.55 hrs. Westcord hotel
  - 08.05 hrs. Hampshire hotel
  - 08.20 hrs. Arrival at Art Centre Delft
- Coach 2 morning transport
  - 07.45 depart from Delft central station, in front of restaurant Pavarotti (at the Coenderstraat).
- At the end of each day these 2 coaches will return to the same stops.



- Public transport by bus in case you miss the coach:
  - 9292.nl (install the app) Link: busroute Art Centre 9292.nl
  - You can pay by creditcard or bankcard in the bus
- Walking from Delft central station to art centre: 53 minutes
- Cycling from Delft central station to art centre: 15 minutes

- Bus will leave from Art Centre to conference dinner: Thursday 17:00. Will return to Delft Centre and Art Centre at 21:30.

DELFT AND SURROUNDINGS

- Centre of Delft (Market, Beestenmarkt)
- Nieuwe kerk, Prinsenhof
- The Hague (Binnenhof/Mauritshuis/Int. Court of Justice, Scheveningen Beach)
- Christiaan Huygens' Hofwijck
- City of Leiden (Boerhaave Science Museum)
- City of Rotterdam (Harbour/Euromast)
- Art walk (ask at reception)

Land Art Delft walks

ORGANIZING COMMITTEE

FNS conference chairs

Farbod Alijani

Peter Steeneken

Herre Van der Zant

FNS scientific committee

Adrian Bachtold

Ho Bun Chan

Mark Dykman

Fabio Pistolesi

Michael Roukes

Eva Weig

Hiroshi Yamaguchi

LOCAL ORGANIZERS

Lucienne Dado

Annemieke van Ast

Nick Wansink

Santiago Silva

Hendrik Jaap Algra

Álvaro Bermejillo Seco

Hans Goosen

Thijmen

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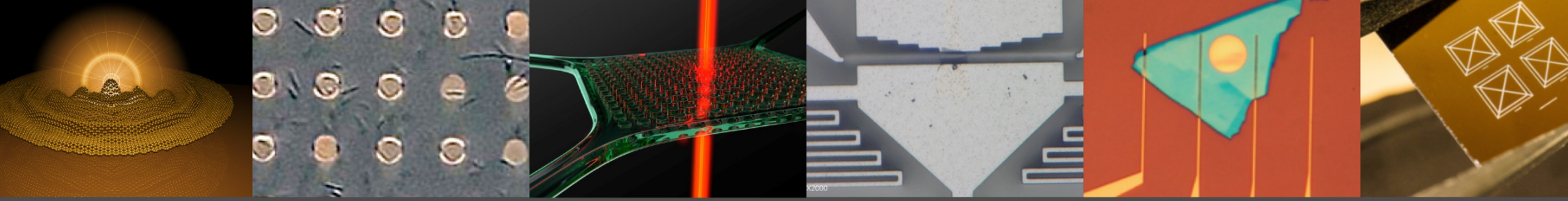
TIME-RESOLVED 3D OPTICAL PROFILOMETERY



FNS / 2023

Frontiers of Nanomechanical Systems

TU Delft

6 - 9 June 2023

ENJOY

THE CONFERENCE

SiTime · SFB 1432 · TU Delft · Oxford Instruments · Zurich Instruments · KLA Instruments · Intermodulation products · lyncée tec — Time-resolved 3D optical profilometery