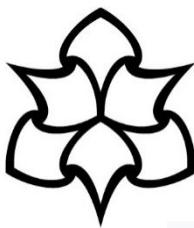


# Healthy Living

Olly Duncan

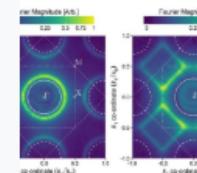


## Challenge Areas

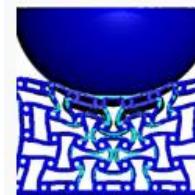


**Health**

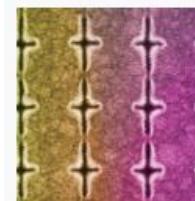
## Special Interest Groups (SIGs)



**Acoustic Metamaterials**



**Mechanical Metamaterials**



**Photonic Metamaterials**



**Wireless and Microwave Metamaterials**



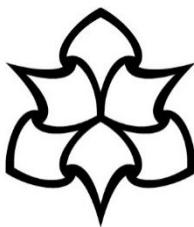
**Manufacturing and Scale Up**



**Modelling and AI-Design**



**Active Metamaterials**



## Health Challenge

Dr Tom Allen

### Healthy living

Dr Olly Duncan

#### Exercise

Olga Kravchenko

- Facilitating sport, exercise & physical activity
- Monitoring exercise & physical activity
- Active travel
- Injury risk reduction (PPE, footwear, equipment etc)
- Disabled sport

#### Wellbeing

Prof. Emma Hodson-Tole

- Work life balance
- Sleep
- Healthy eating / lifestyles
- Transcranial magnetic stimulation
- Mental health
- Pollution

#### Ageing

Prof. Georges Limbert

- Falls / fall monitoring
- Exoskeletons
- Implants
- Facilitating independence
- Care in the community

### Healthcare

Dr Calum Williams

#### Monitoring & diagnosis

Mr Martin Leigh

- Patient monitoring
- Sensors and point-of-care testing
- Implantable bioelectronics and wearables
- Biomedical imaging and diagnostics
- Digital Health

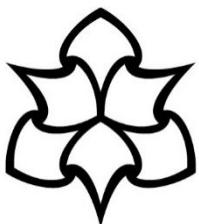
#### Therapeutics

Dr Rupam Das

- Physical disability (prosthetics, orthotics & wheelchairs)
- Dentistry
- Trauma & first aid (wound healing, smart dressings / bandages, braces & splints)
- Tissue engineering and scaffolds
- Target drug delivery and treatments
- Theranostics
- Photothermal therapy

Prevention

Treatment



# Exercise



GOV.UK

Home > Transport > Driving and road transport > Cycling and walking

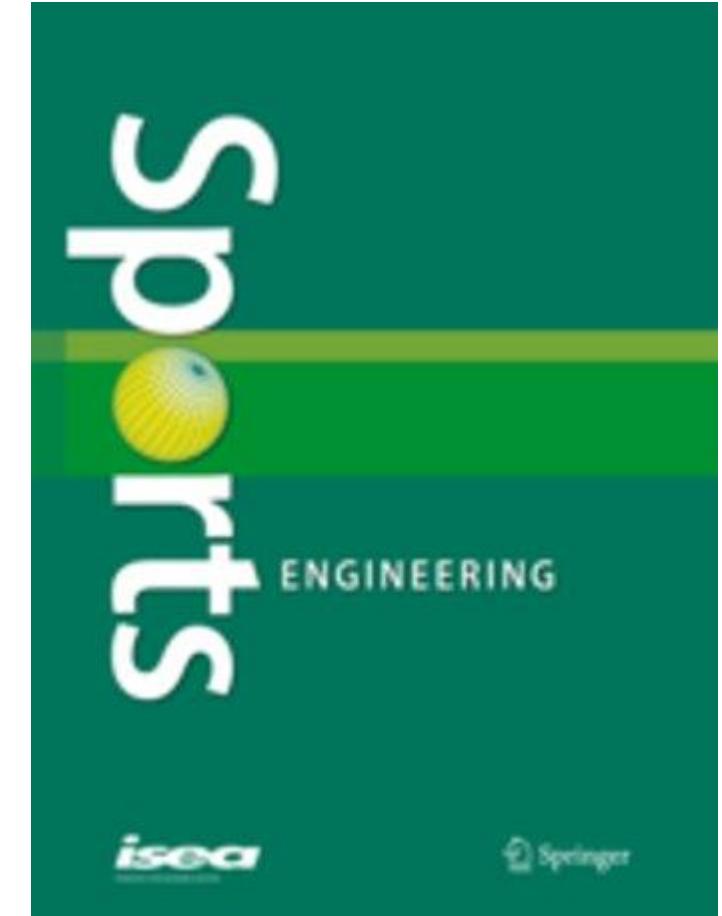
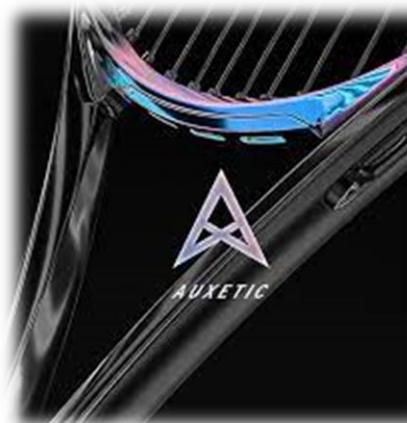
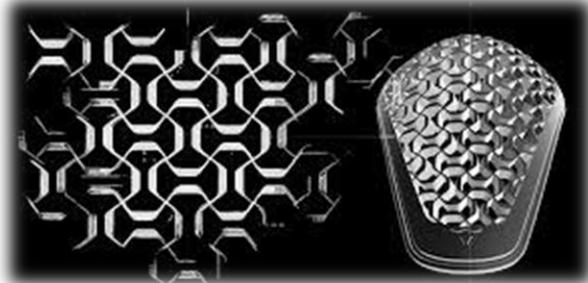
News story

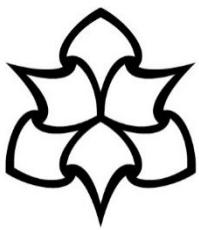
**Healthy, cost-effective travel for millions as walking and cycling projects get the green light**

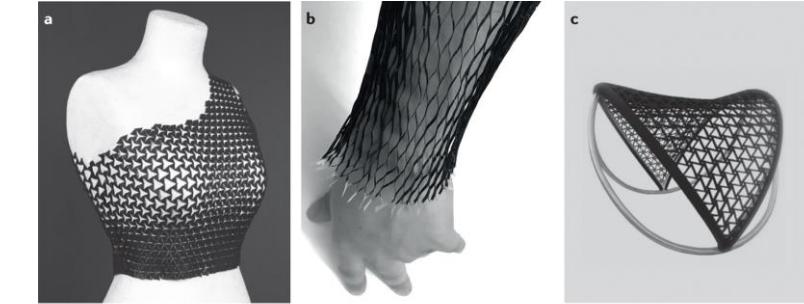
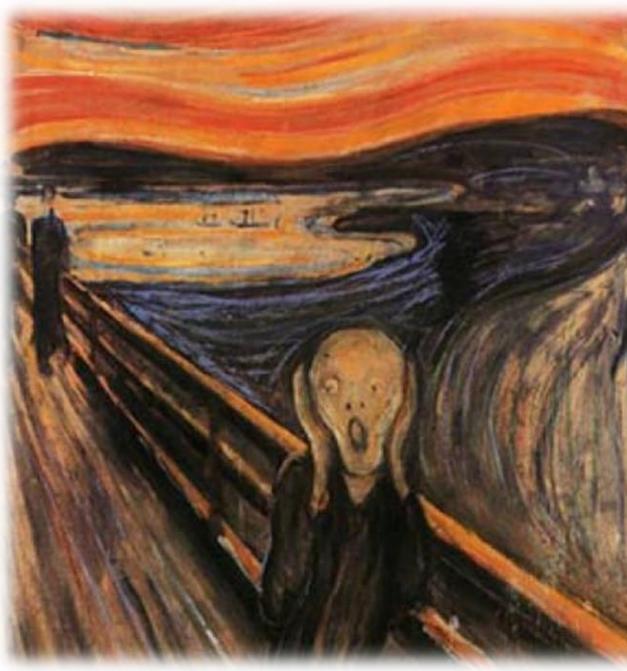
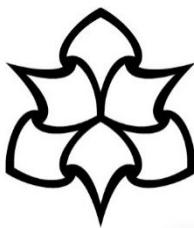


## Call for Papers: Topical Collection on Metamaterials in Sport

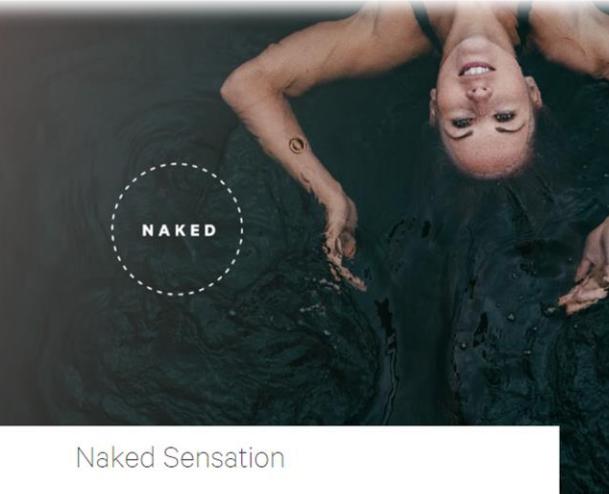
- Mechanical metamaterials
- Active metamaterials
- Acoustic metamaterials and metasurfaces
- Augmented reality
- Electromagnetic metamaterials for biosensors





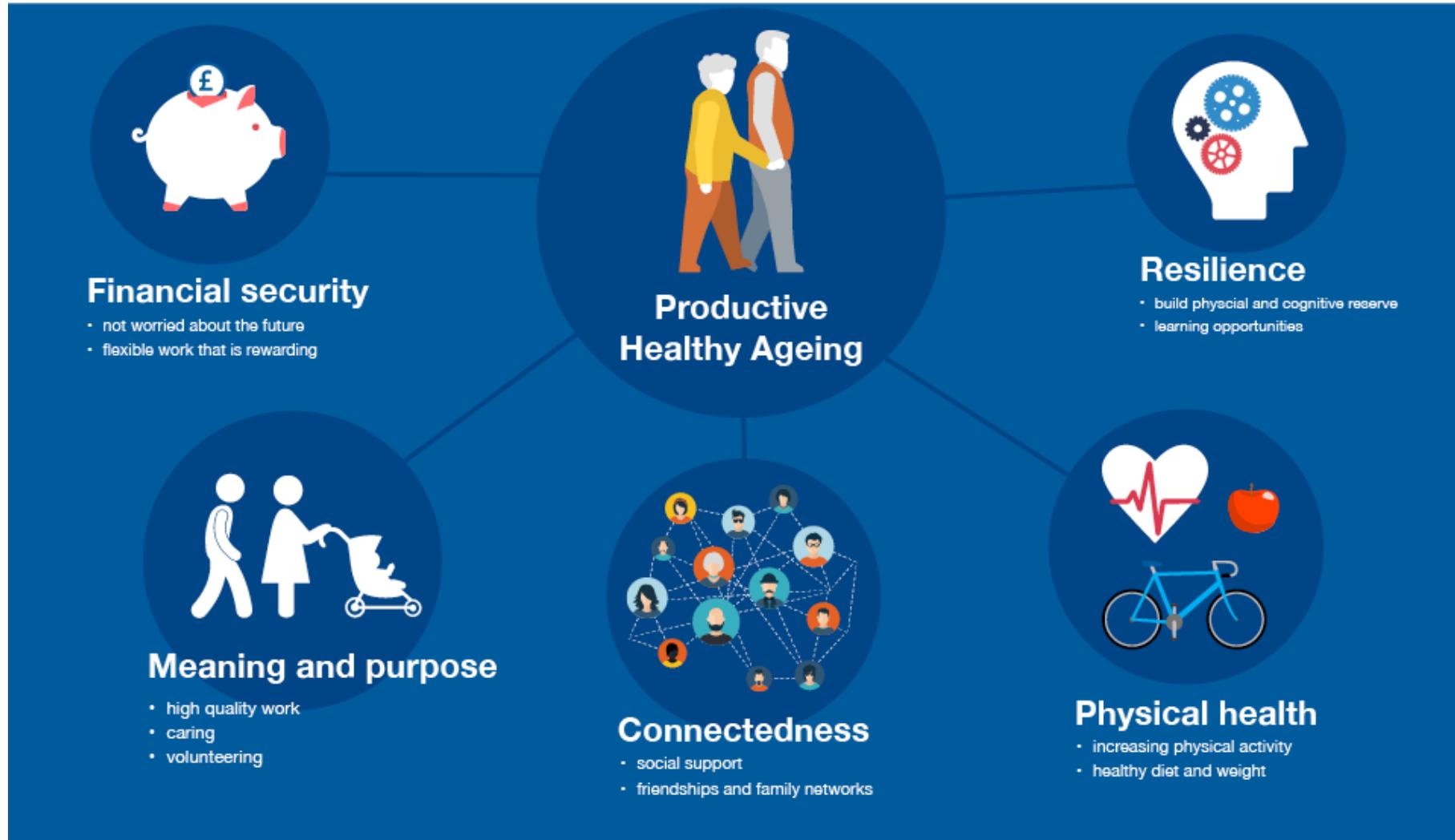
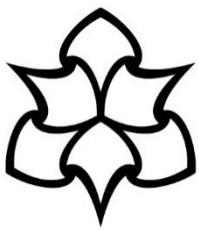


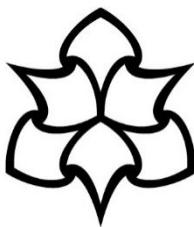
Nature Reviews | Materials



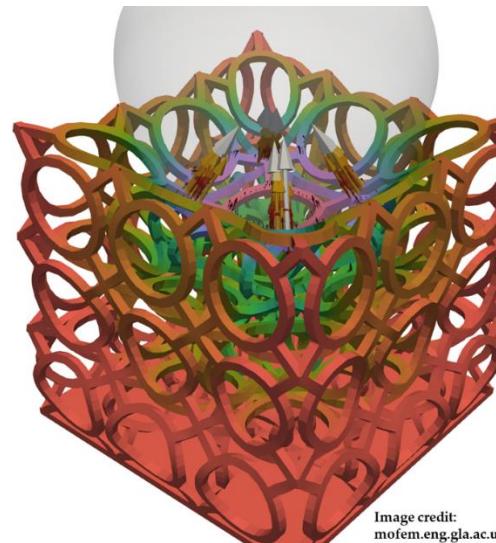
We engineer our Naked Sensation to give us the feeling of wearing nothing with all the coverage we need when we're moving from Down Dog to Forward Fold. This sensation is all thanks to you—we heard your feedback, loud and clear, that you wanted close-to-body styles that would give you the unrestricted movement of a tight with only gentle compression.

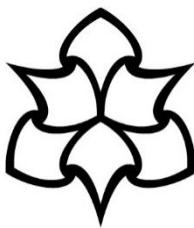






## Mechanical Metamaterials





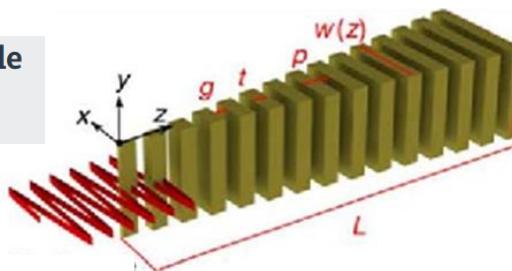
## Acoustic Metamaterials & Metasurfaces



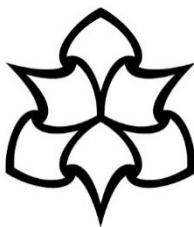
Sound is the strongest correlator with perception of feel

An Acoustic Metamaterial-Based Sensor Capable of Multiband Filtering and Amplification

Huang Xinjing, Yan Yutian, +2 authors Rui Xiaobo · Published 15 April 2020 · Physics · IEEE Sensors Journal



Sorry what did you say?

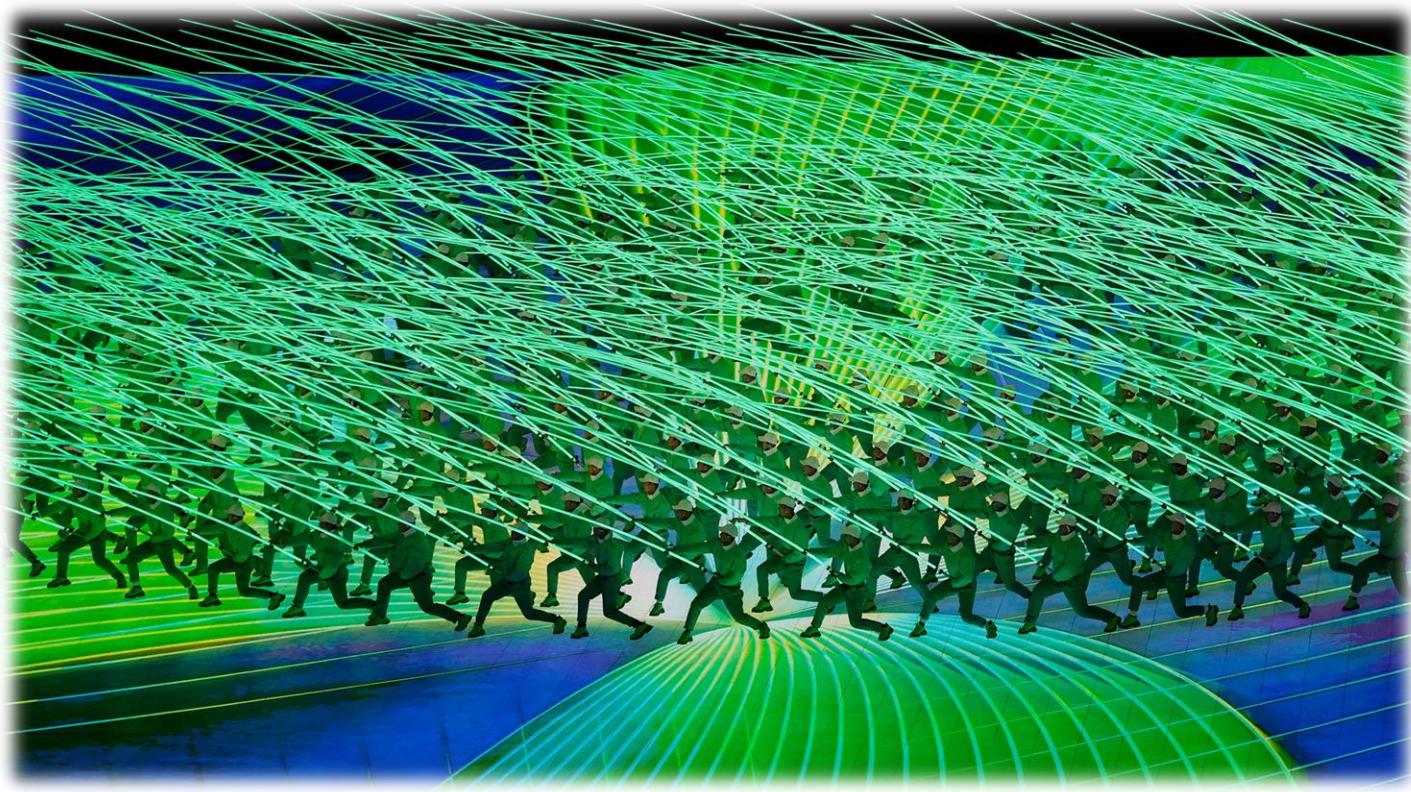


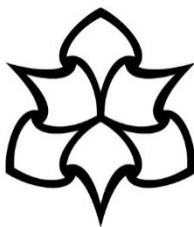
## Augmented Reality

Navigation, or monitoring fitness apps

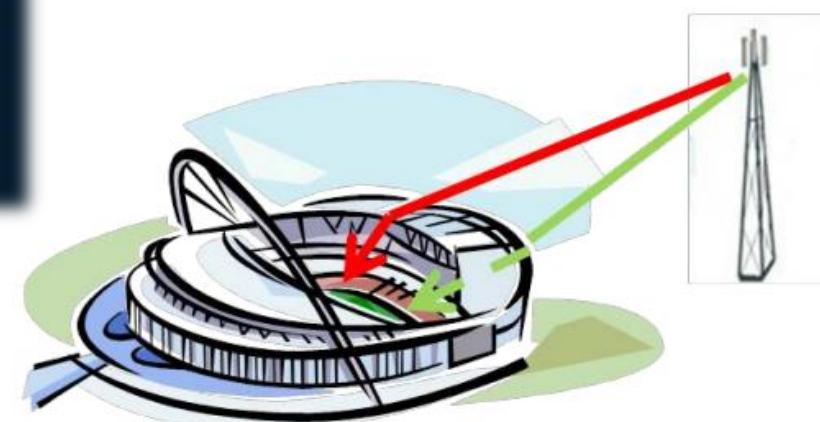


CGI in the Olympic opening ceremony –better on a screen?





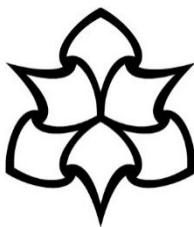
## Electromagnetic metamaterials



Original research

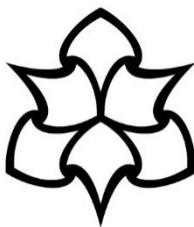
Unique diagnostic signatures of concussion in the saliva of male athletes: the Study of Concussion in Rugby Union through MicroRNAs (SCRUM) 

 Valentina Di Pietro <sup>1, 2, 3</sup>, Patrick O'Halloran <sup>1, 3</sup>, Callum N Watson <sup>1</sup>, Ghazala Begum <sup>3</sup>, Animesh Acharjee <sup>2, 4, 5</sup>,



## The Spider Man Slide

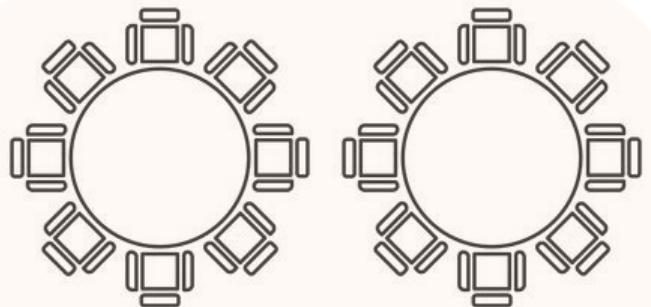




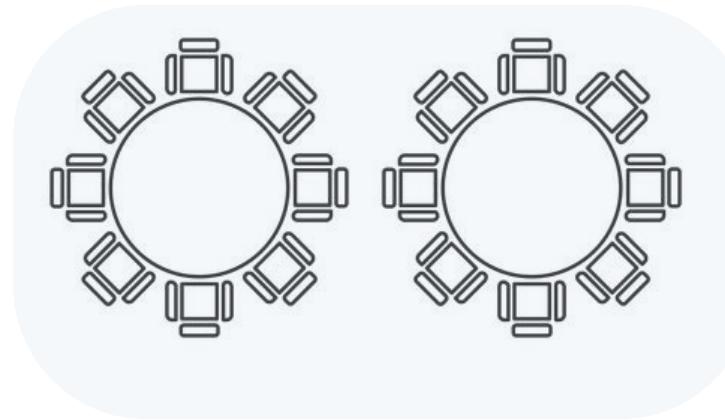
# Roundtable Discussions

*Opportunities for metamaterials in healthy living: questions, ideas, projects*

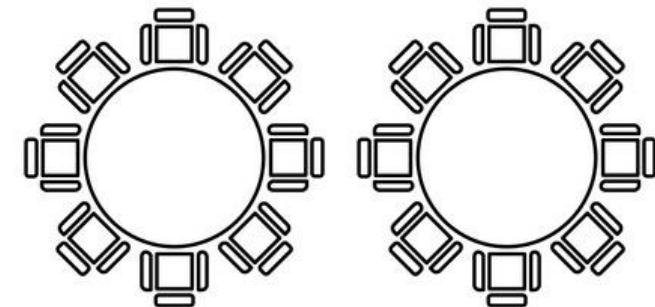
Ageing



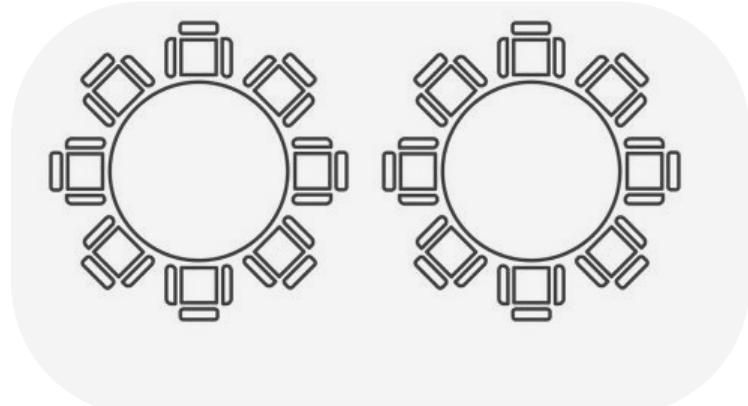
Exercise



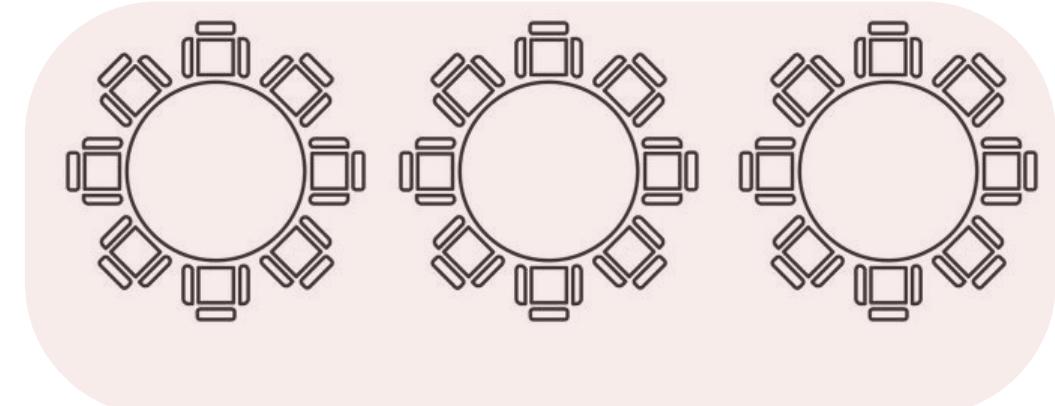
Wellbeing

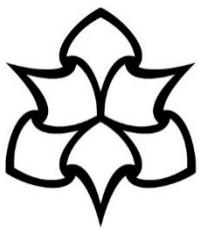


Keynote: Healthy Living



Wildcard





**TOPIC**

Big research  
questions

How could  
metamaterials  
help?

Challenges

Proof of concept  
/ demonstrators

Longer research  
projects