

# The metrology of quantities which can be counted

CCU/CCQM workshop

**28-30 March 2023**

Welcome and  
background to the workshop

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↑↑↑ CCU ↑↑↑ CCQM

# Background

- Physical processes and phenomena are often measured by counting such as radioactive decay processes and even quantities that are considered to be of a continuous nature such as length and time might be quantified by counting for practical reasons.
- Counting is already a common process in the chem/bio sector such as medicine or even car exhaust.
- The CCQM has been in a long discussion about quantized measurements and in particular the status of the mole and the role of counting quantities within the SI.
- Definitions of other quantities such as the electrical current or the mass can be expressed, at least in principle, such that they are based on counting or even by counting entities.
- The SI Brochure already acknowledges the relevance of quantities that cannot be described in terms of the seven base quantities of the SI, but have the nature of a count. Those quantities are described as quantities with the associated unit one.
- **There have been many attempts to address the issue and come to the agreement. However, no consensus has been reached so far.**

The idea behind the Workshop is to achieve a common understanding of the counting and related processes.

# Objectives

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- To trigger a discussion on counting and number quantities across the metrological community so that a common understanding of counting is achieved
- To prepare proposals for a clear delineation between
  - kinds of quantity that can only be expressed as a count
  - kinds of quantity where counting is involved in the measurement, but results are expressed not as a count
  - kinds of quantities not involving counting
- To give guidance for:
  - a clearer nomenclature for counted quantities

## As a general outcome

The metrological community should have a joint and clear strategy available on making measurements traceable and comparable that require counting.

# Key topics

The workshop will include three sessions:

**Session 1**, 28 March 2023, 12:00-14:00 UTC

**Concepts and theoretical aspects of counting and the unit one**

**Session 2**, 29 March 2023, 12:00-14:00 UTC

**Counting entities (case studies from electricity, mass, chemistry and biology)**

**Session 3**, 30 March 2023, 12:00-14:00 UTC

**Counting processes & other phenomena (case studies from radioactivity to light)**

## For your information

- ✓ About 450 participants registered
- ✓ The workshop will be recorded for the purpose of writing the report
- ✓ Please keep your camera and microphone off, unless they are called upon to speak during the discussion session.
- ✓ In the end of each Session there will be Panel Q&A followed by discussions
- ✓ The questions during the discussion sessions shall be submitted via the chat



# Agenda for Session 1

## Concepts and theoretical aspects of counting and the unit one

Welcome and background to the workshop	Pavel Neyezhnikov (NSC-IM)	15 min
What questions is the workshop addressing?	Bernd Güttler (PTB)	15 min
Concepts of continuous quantities & countable aggregates and nomenclature	Charles Ehrlich (NIST)	15 min
Quantities with the unit one	Peter Blattner (METAS)	15 min
Counting & why it is different from amount of substance	Richard Brown (NPL)	15 min
Panel Q&A / Discussion	All	45 min

