

# Some open questions in physics I

*Krzysztof A. Meissner  
Instytut Fizyki Teoretycznej  
Wydział Fizyki UW*

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# Content

- Quantum Mechanics
- Standard Model
- dark matter and dark energy
- quantum gravity
- summary

The most incomprehensible fact about the  
Universe is that it is comprehensible

*A. Einstein*

# Introduction

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– physical laws
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- with proper idealization these laws seem to be universal and rigorous
- we have no idea why these statements hold  
the answer belongs to meta-physics rather than physics...

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- but mathematics gives us also a rigorous proof that cognition has its limits:

Gödel theorem + finite resources



“Theory of Everything” is impossible

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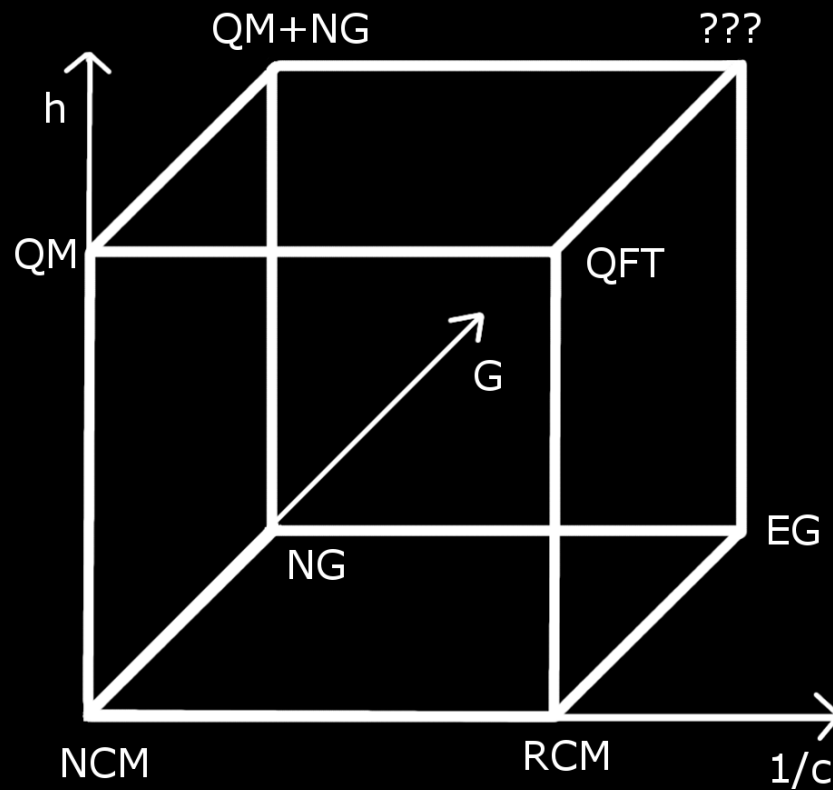
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- explanation in physics means converting “accidental” into “inevitable”
- how far can we go?

# Cube of theories

Fundamental dimensionful constants:  $1/c$ ,  $\hbar$ ,  $G$



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- problem of measurement (Copenhagen, Everett, Bohm, Penrose, ...) totally unclear...