Fresh look at the dynamics

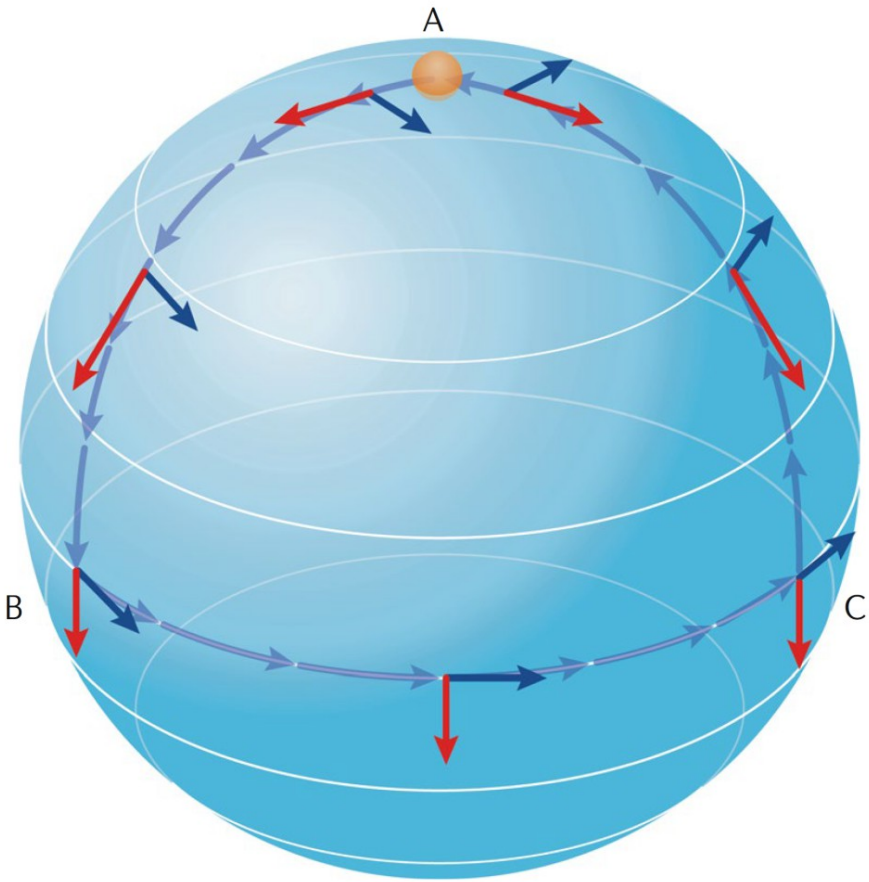
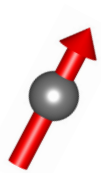


Image from Nature Rev. Phys. 1, 437 (2019)

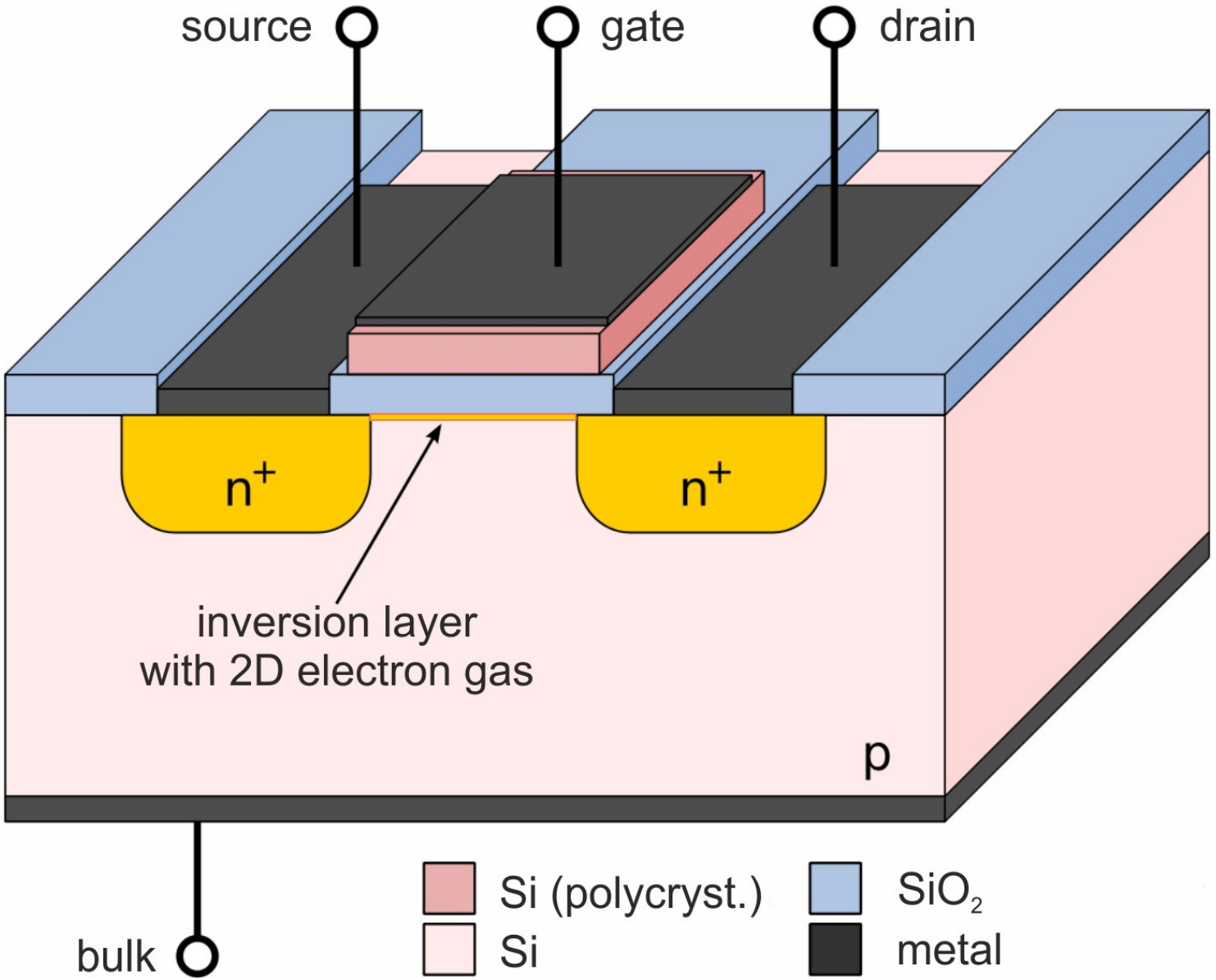
Berry curvature

Berry phase

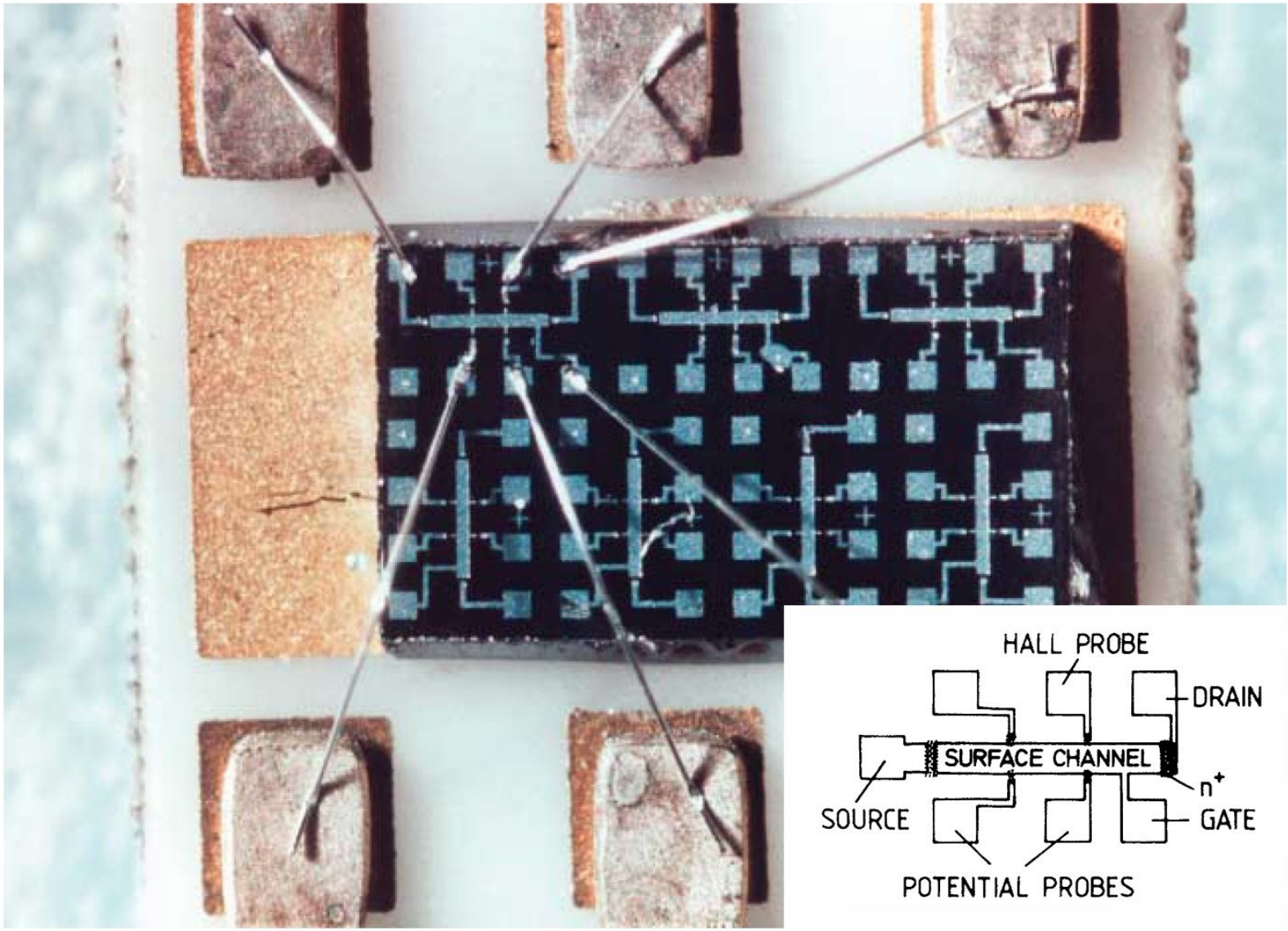


by Alexander Tsirlin, Leipzig University

Lecture 5: November 4, 2024



QHE sample



Phil. Trans. Royal Soc. A 363, 2203 (2005) and Phys. Rev. Lett. (1980)

Klaus von Klitzing
(born 1943)

$$R_K = \frac{h}{e^2} \simeq 25812.807\,\Omega$$

von Klitzing constant

1980: discovery of QHE

1985: Nobel prize in physics

Klaus von Klitzing

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$$R_K = \frac{h}{e^2} \simeq 25812.807\,\Omega$$

von Klitzing constant

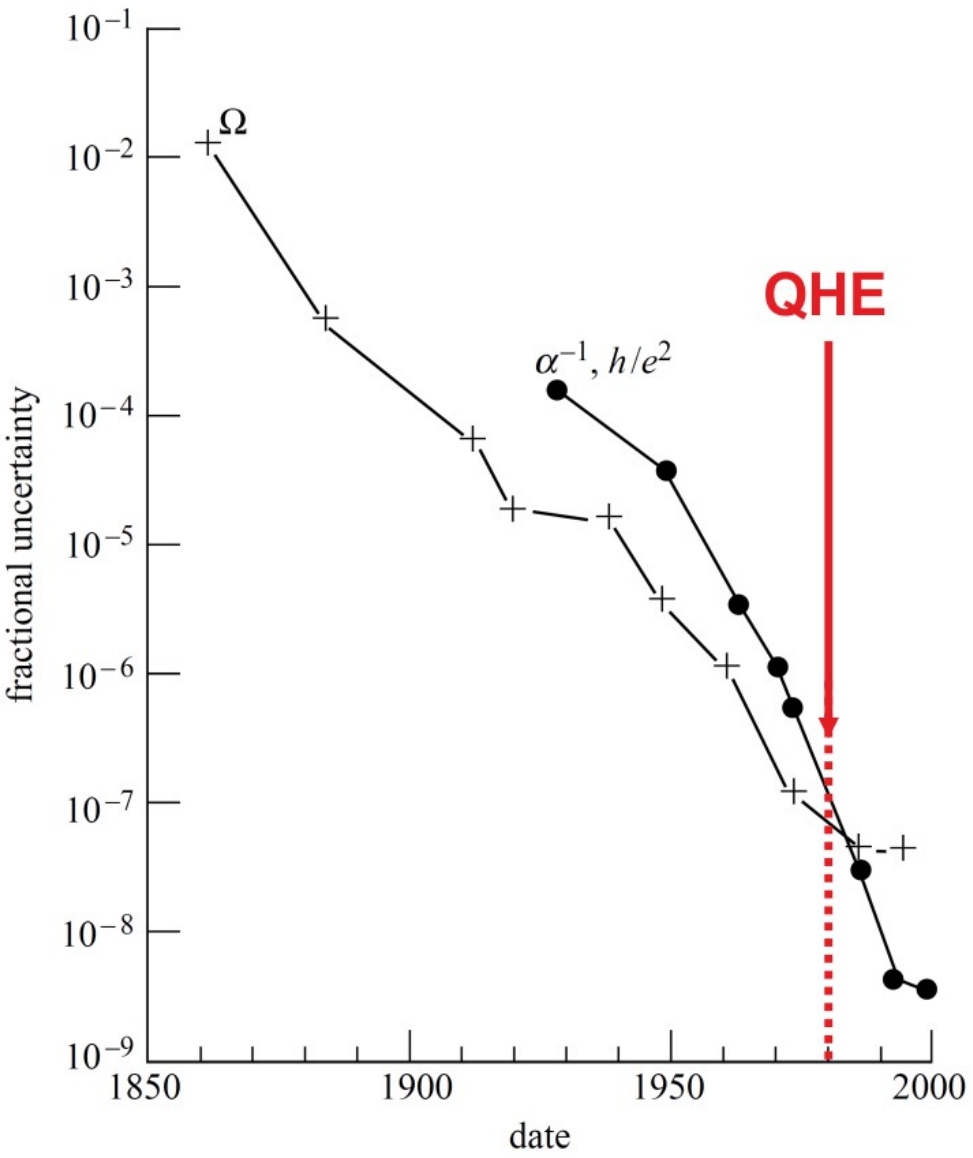
1980: discovery of QHE

1985: Nobel prize in physics

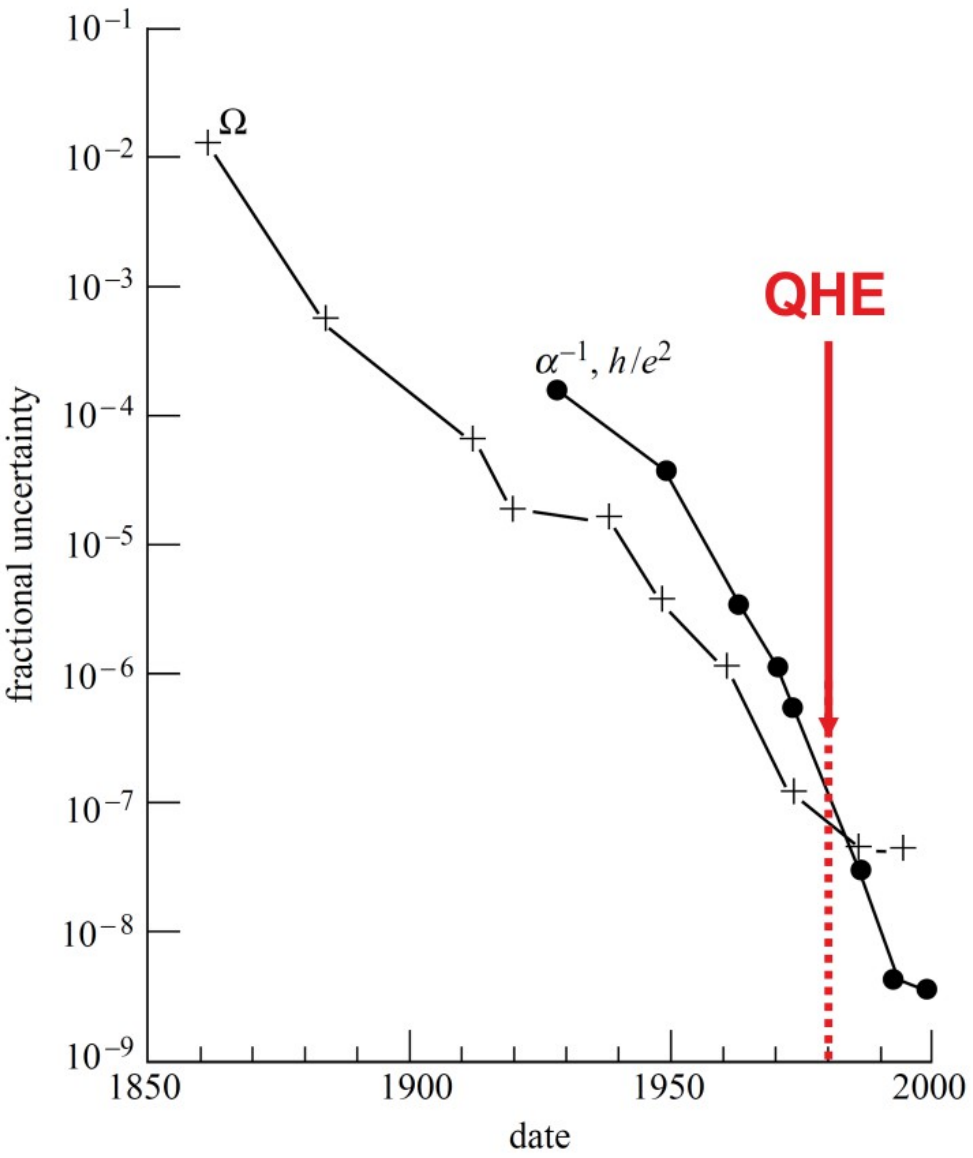
Das Wichtigste für mich ist aber die Von-Klitzing-Konstante. Das bleibt, das ist unsterblich, und deshalb habe ich auch keine Angst vor dem Tod

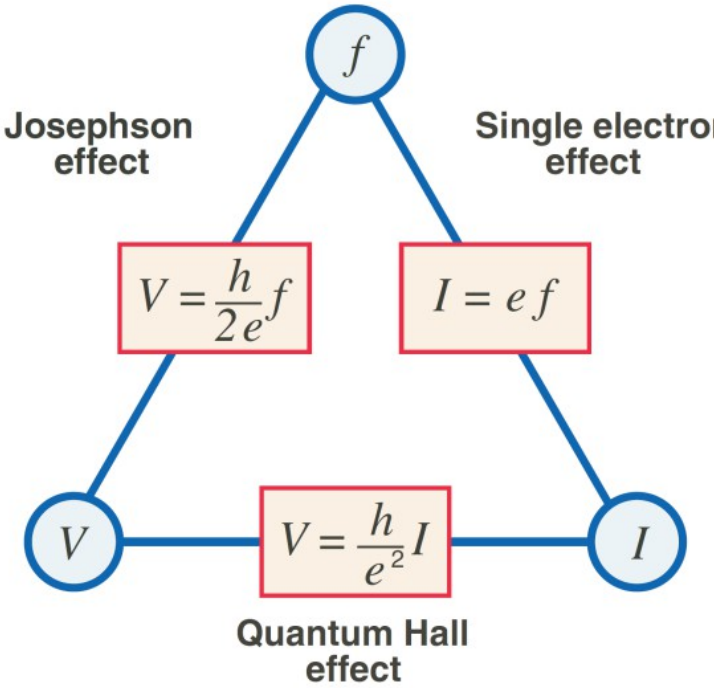
K. von Klitzing

Metrology standard



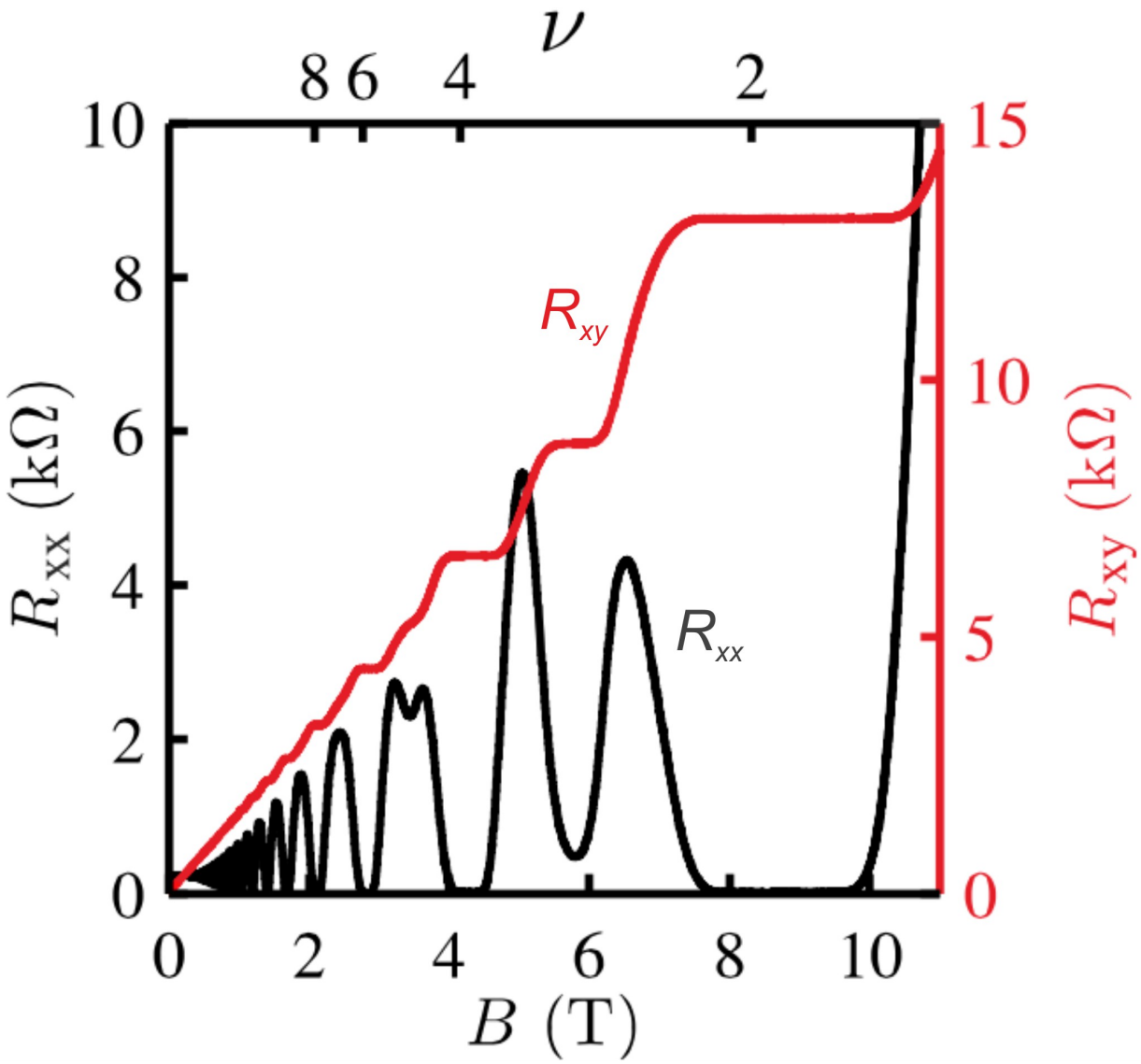
Phil. Trans. Royal Soc. A 363, 2203 (2005) and Rep. Prog. Phys. 64, 1603 (2001)





Metrological Triangle

Phil. Trans. Royal Soc. A 363, 2203 (2005) and Rep. Prog. Phys. 64, 1603 (2001)

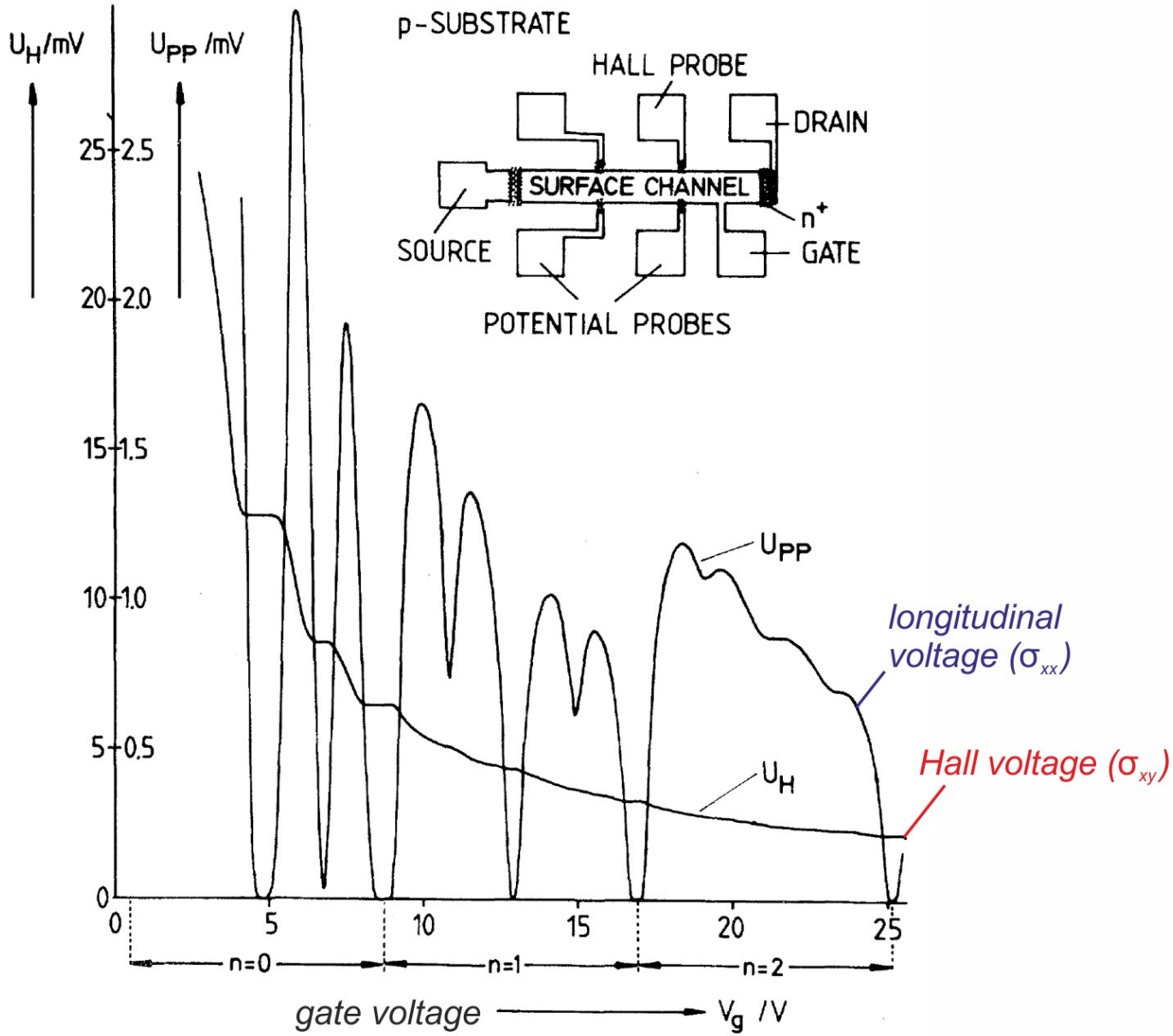


AlGaAs/GaAs heterostructure

$T = 1.9\,\mathrm{K}$

New J. Phys. 14, 083015 (2012)

Experimental data



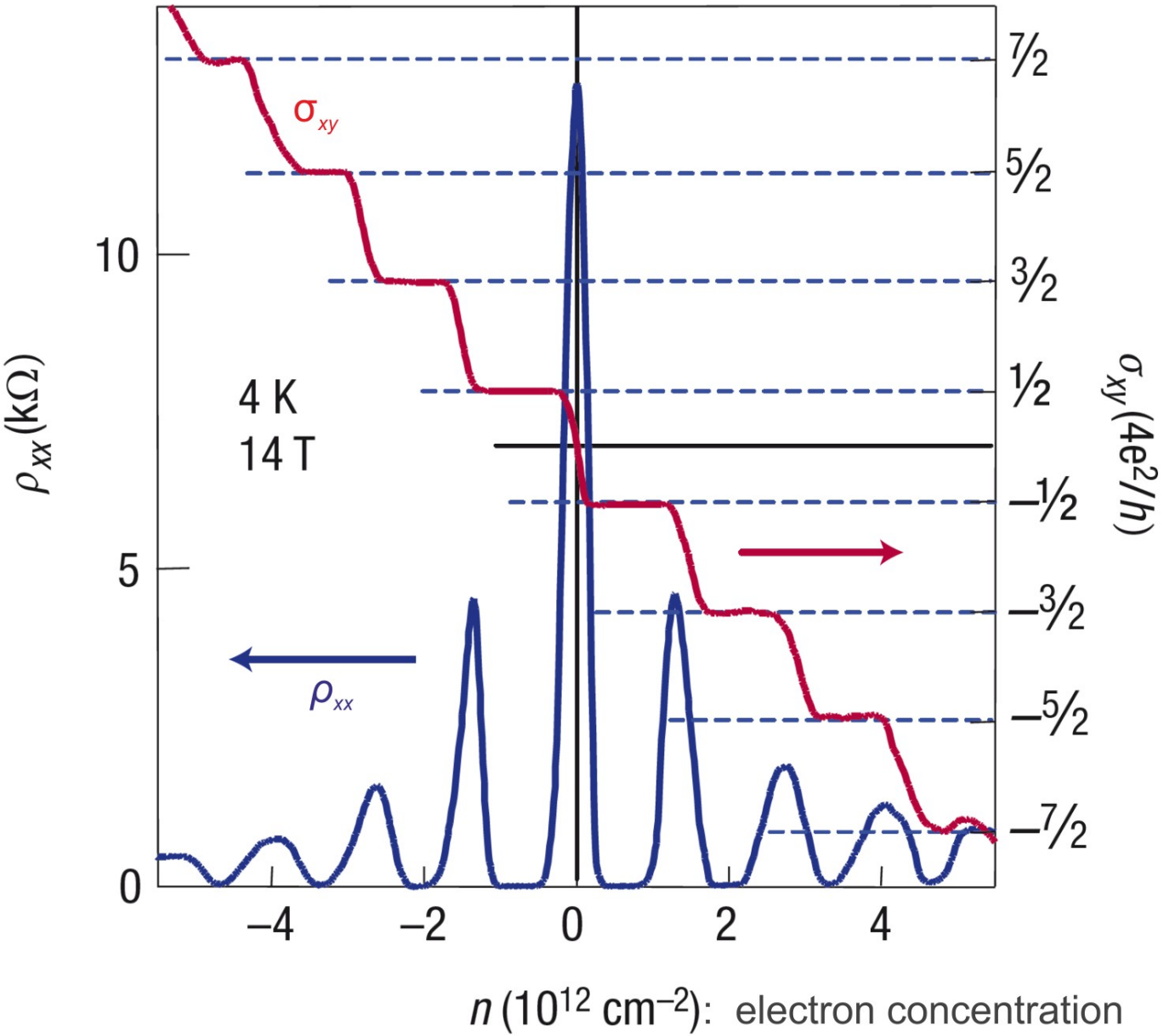
Si-MOSFET

$B = 18\,\mathrm{T}$

$T = 1.5\,\mathrm{K}$

Phys. Rev. Lett. 45, 494 (1980)

Experimental data



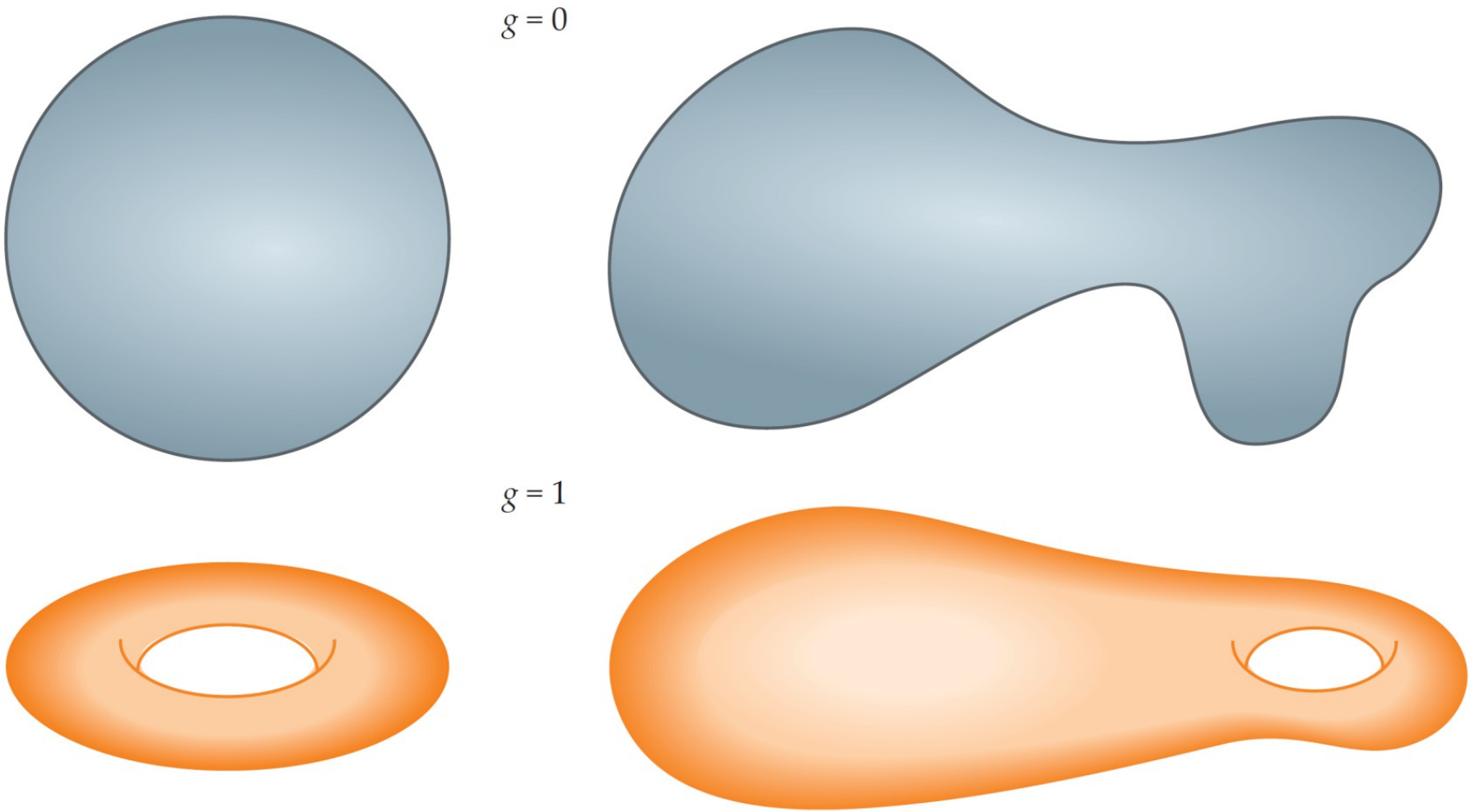
Graphene

$B = 14\,\mathrm{T}$

$T = 4\,\mathrm{K}$

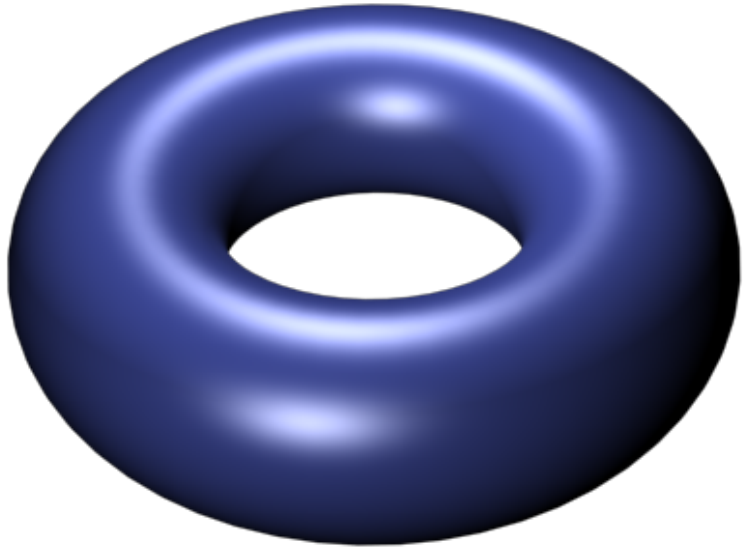
Nature Mater. 6, 183 (2007)

Genus as topological standard



Phys. Today 73(9), 30 (2020)

Topological invariance

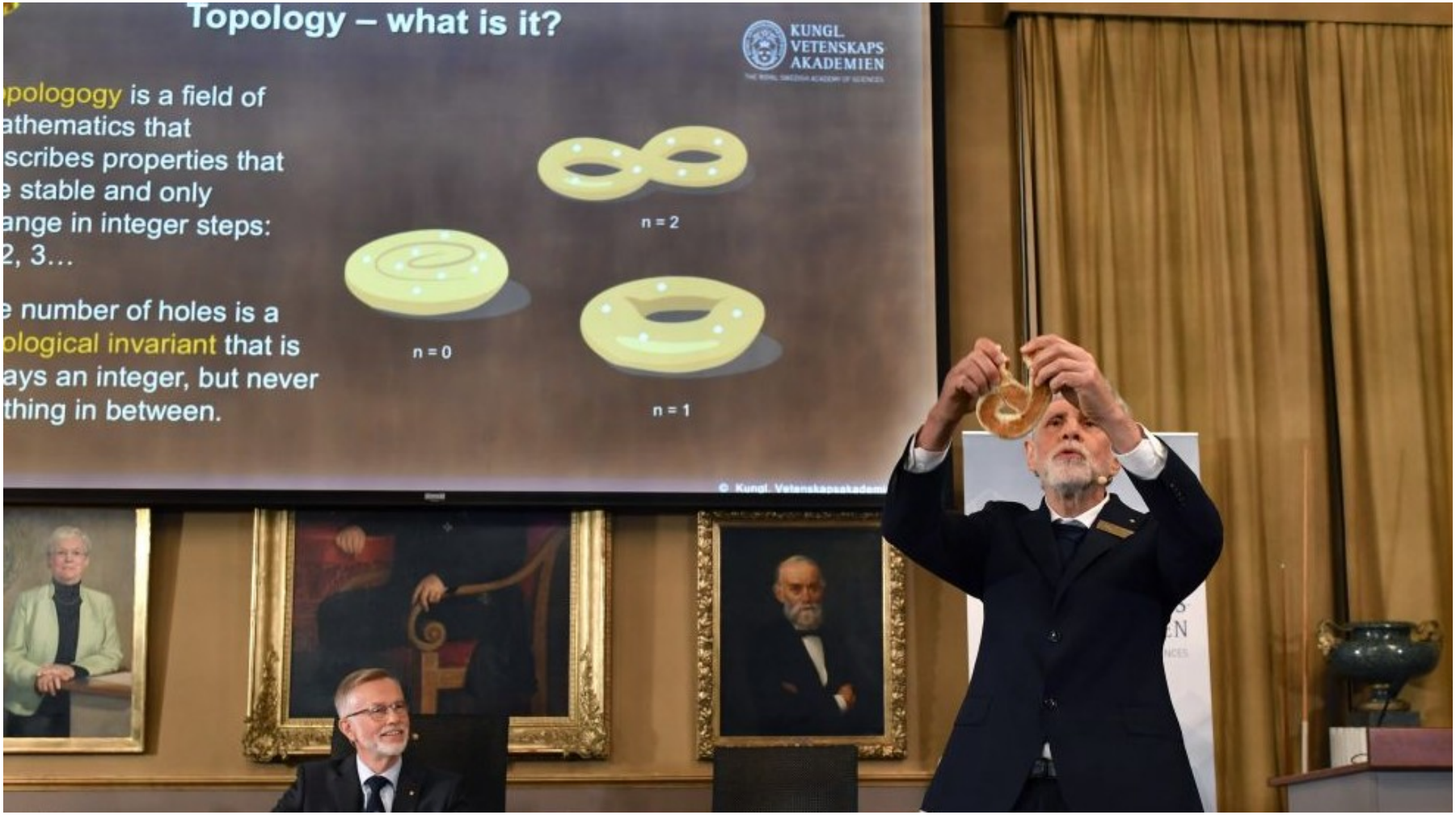


Coffee mug is topologically equivalent to a torus

Image credit: Pokipsy76 (CC-BY-SA) and Open Clip Art Library

Nobel prize award ceremony 2016: Kosterlitz, Thouless, Haldane

Image credit: Jonathan Nackstrand and Anders Wiklund (fair use)



Nobel prize award ceremony 2016: Kosterlitz, Thouless, Haldane

Image credit: Jonathan Nackstrand and Anders Wiklund (fair use)