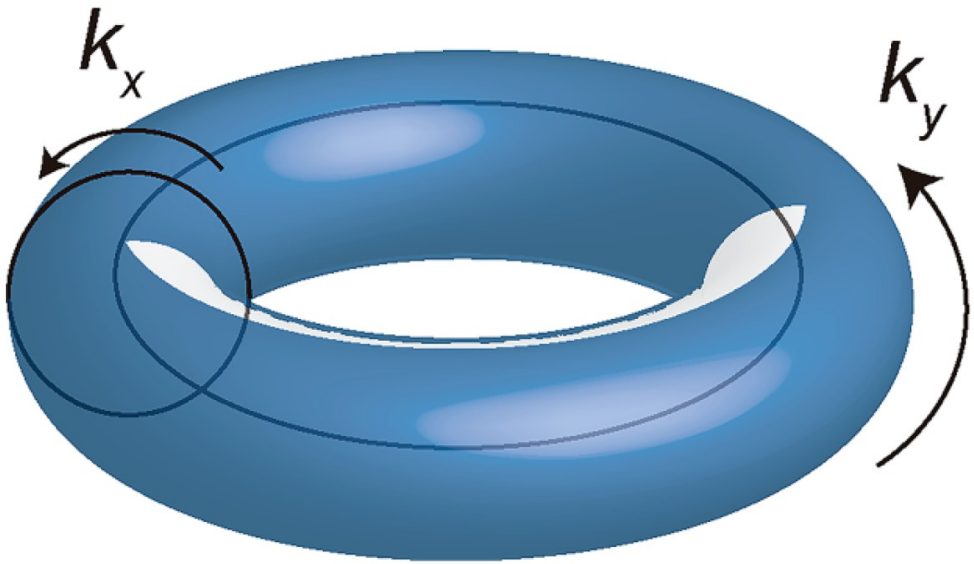
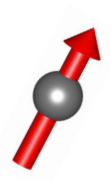
Band topology

anomalous velocity

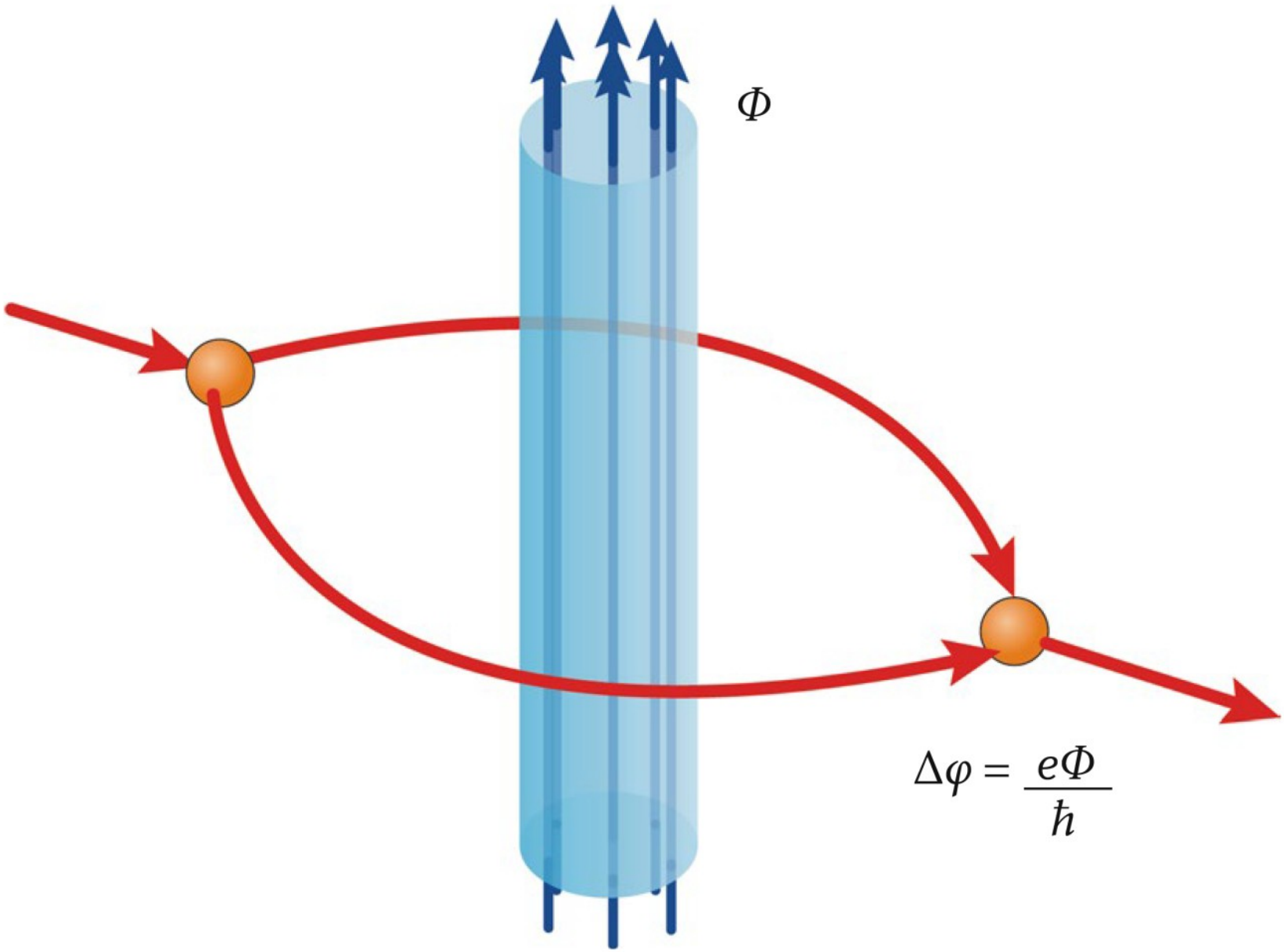




by Alexander Tsirlin, Leipzig University

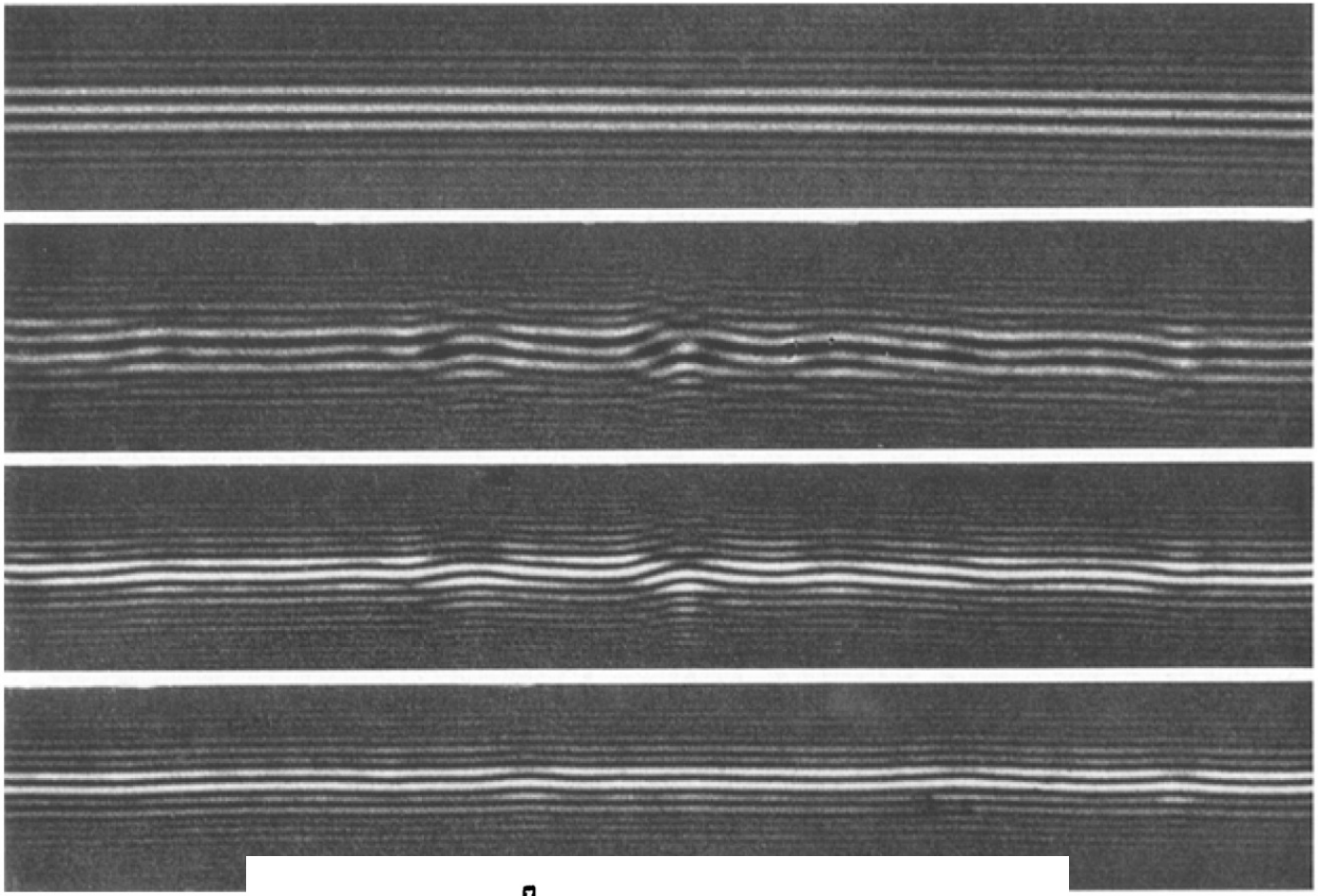
Lecture 6: November 5, 2024

Aharonov-Bohm effect



Nature Rev. Phys. 1, 437 (2019)

Aharonov-Bohm effect: electronic

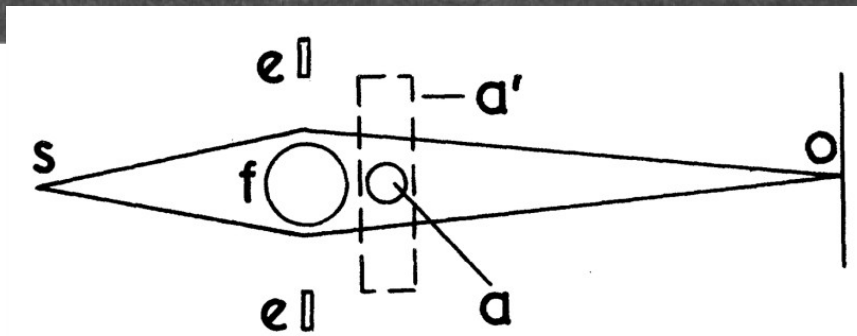


field off

field on

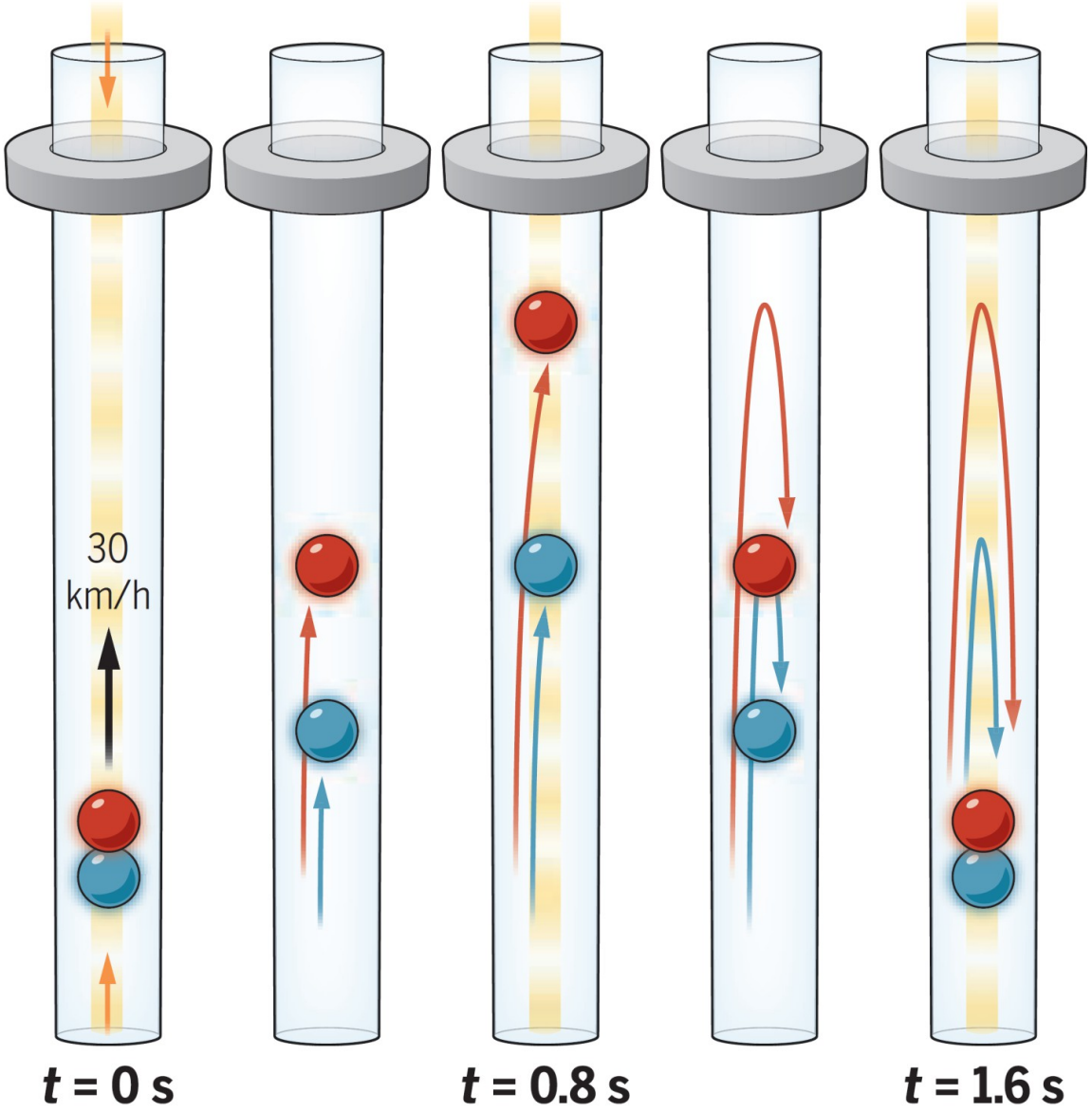
field on

field off



Phys. Rev. Lett. 5, 3 (1960)
Z. Phys. 169, 263 (1962)

Aharonov-Bohm effect: also gravitational

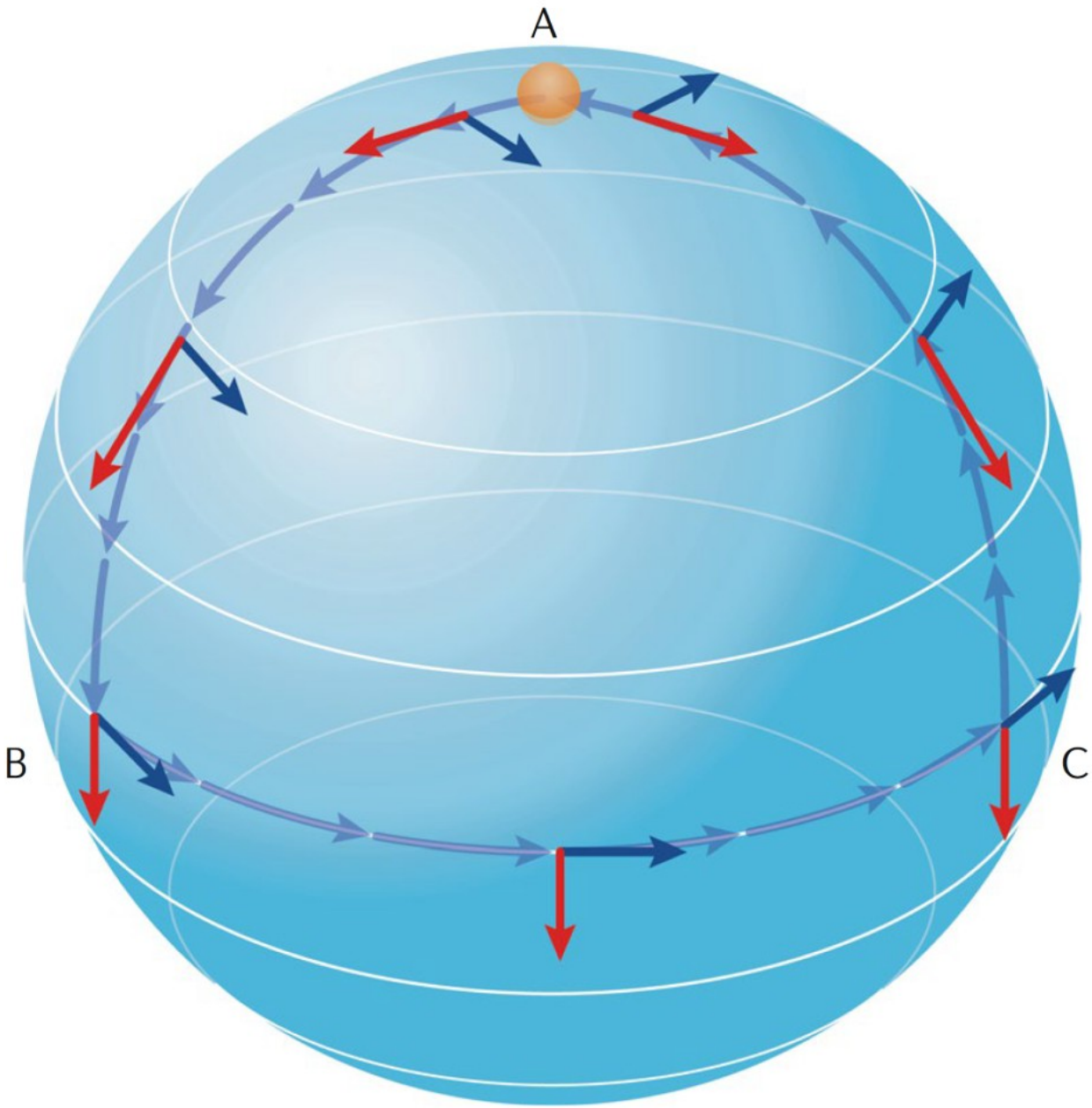


tungsten ring

Rb atoms

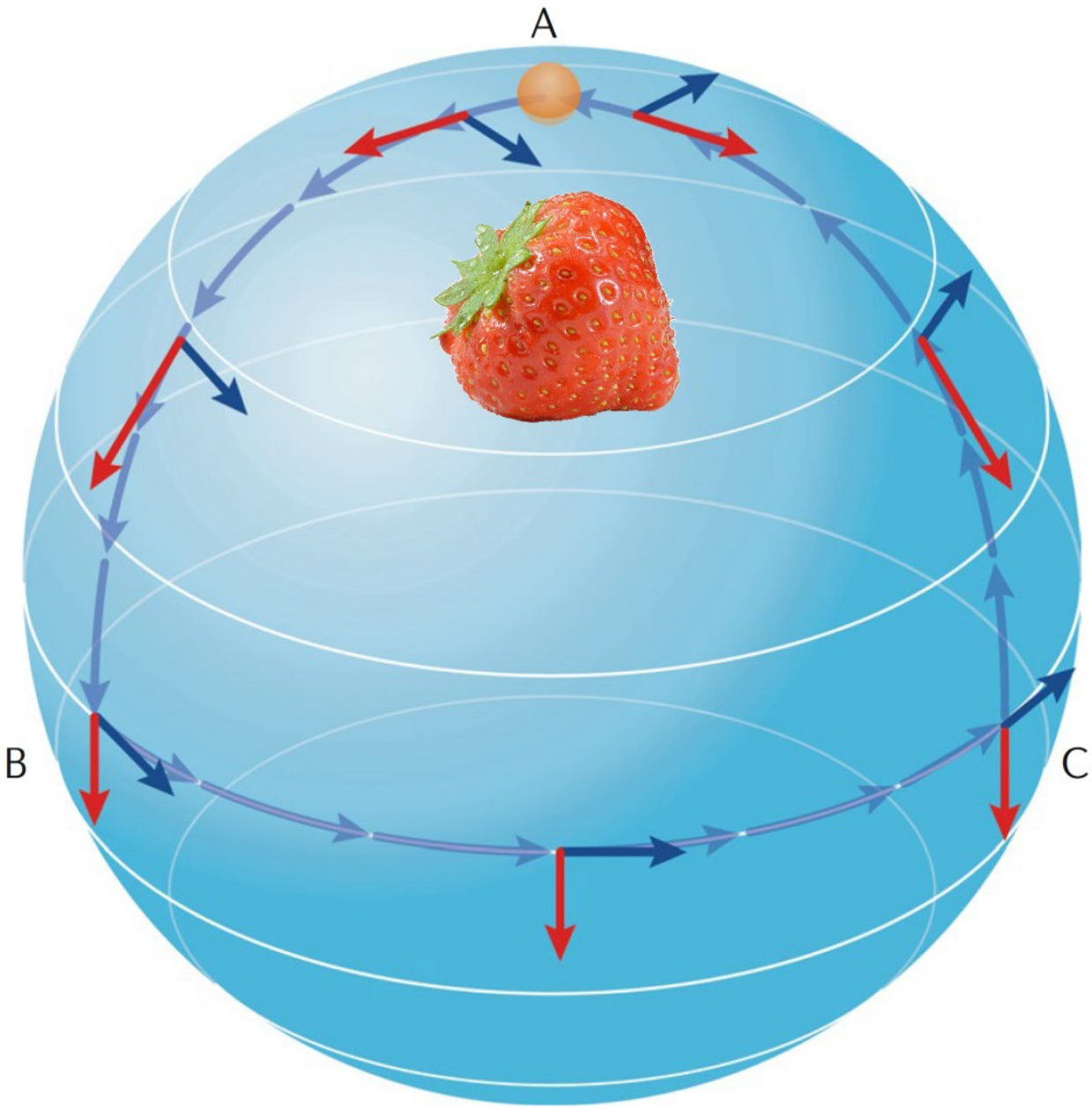
Science 375, 142 (2022)

Parallel transport



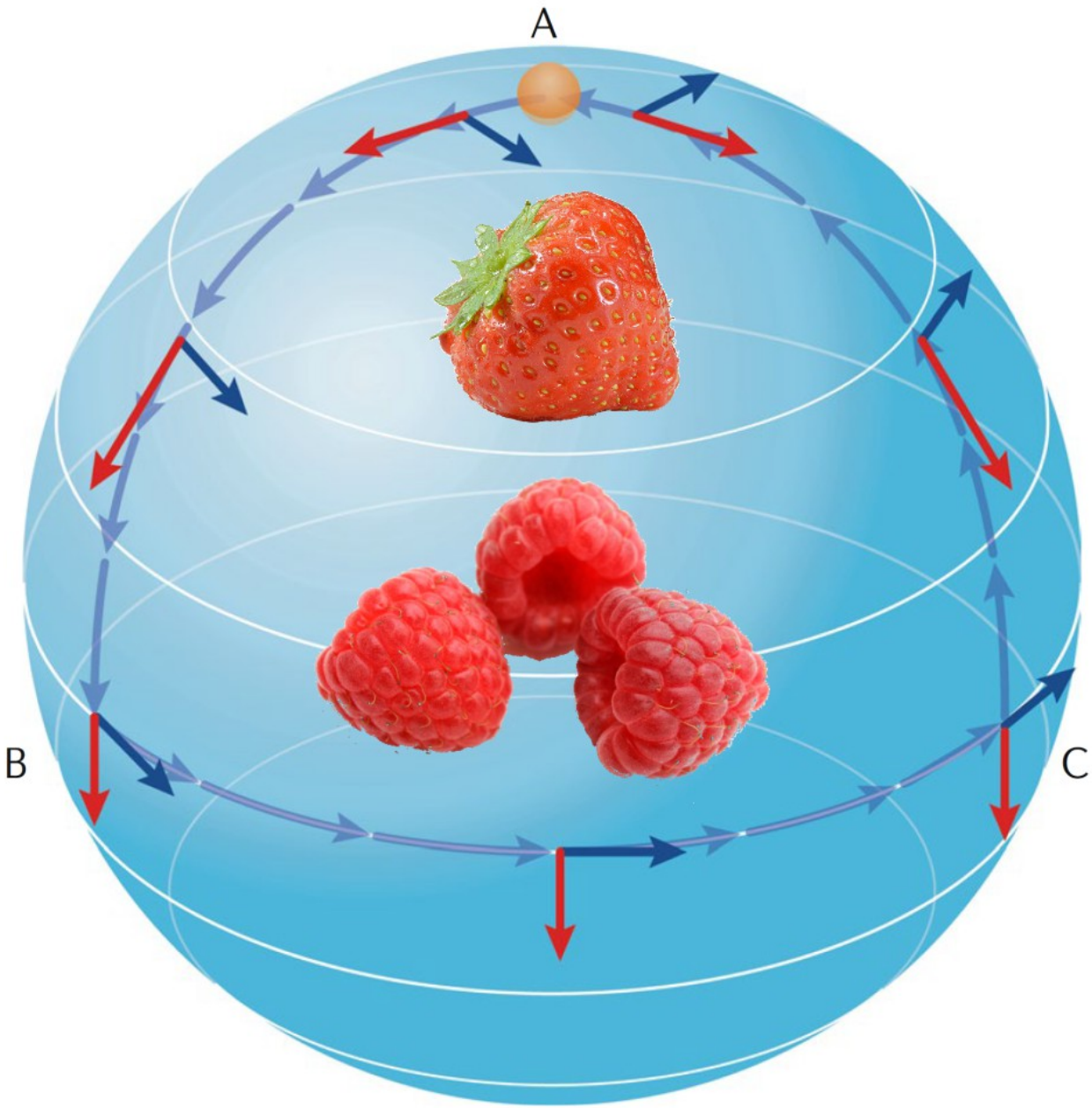
Nature Rev. Phys. 1, 437 (2019)

Parallel transport



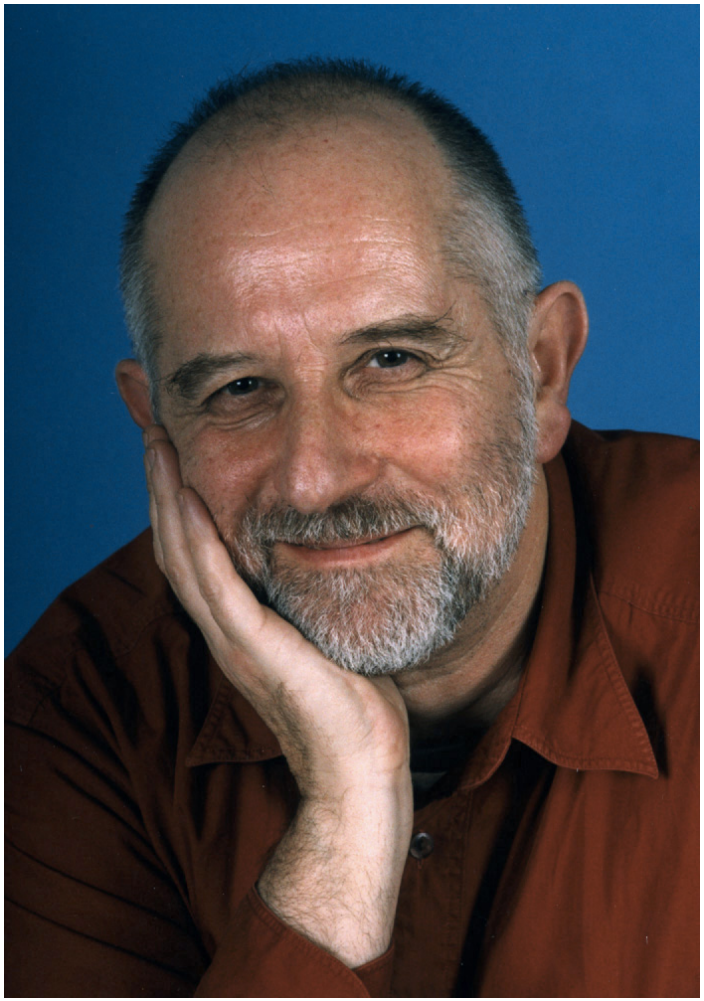
Nature Rev. Phys. 1, 437 (2019)
Image credit: Ivar Leidus and fir0002 (CC-BY)

Parallel transport



Nature Rev. Phys. 1, 437 (2019)
Image credit: Ivar Leidus and fir0002 (CC-BY)

Berry's face

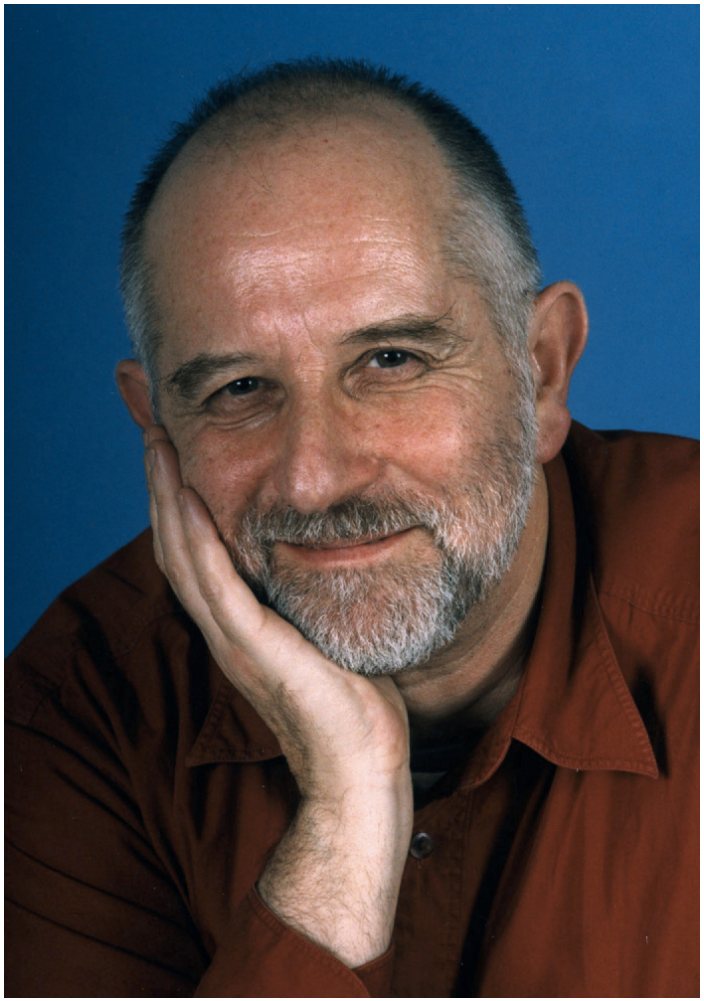


Sir Michael Berry
born 1941

1983: formulation of geometrical phase

2000: Ig Nobel prize (levitating frog)

Image credit: Michael Berry



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2000: Ig Nobel prize (levitating frog)

Related works

Pancharatnam (1956): geometrical phase in optics

Joshua Zak (1989): Berry phase in periodic systems

Image credit: Michael Berry

No seminar this week

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First seminar on 14.11 or 21.11

Susanne Moritz:

degeneracy of Landau levels

Lea Polonyi, Elise Morawe:

1) Aharonov-Bohn effect
2) Berry curvature / anomalous velocity from matrix elements

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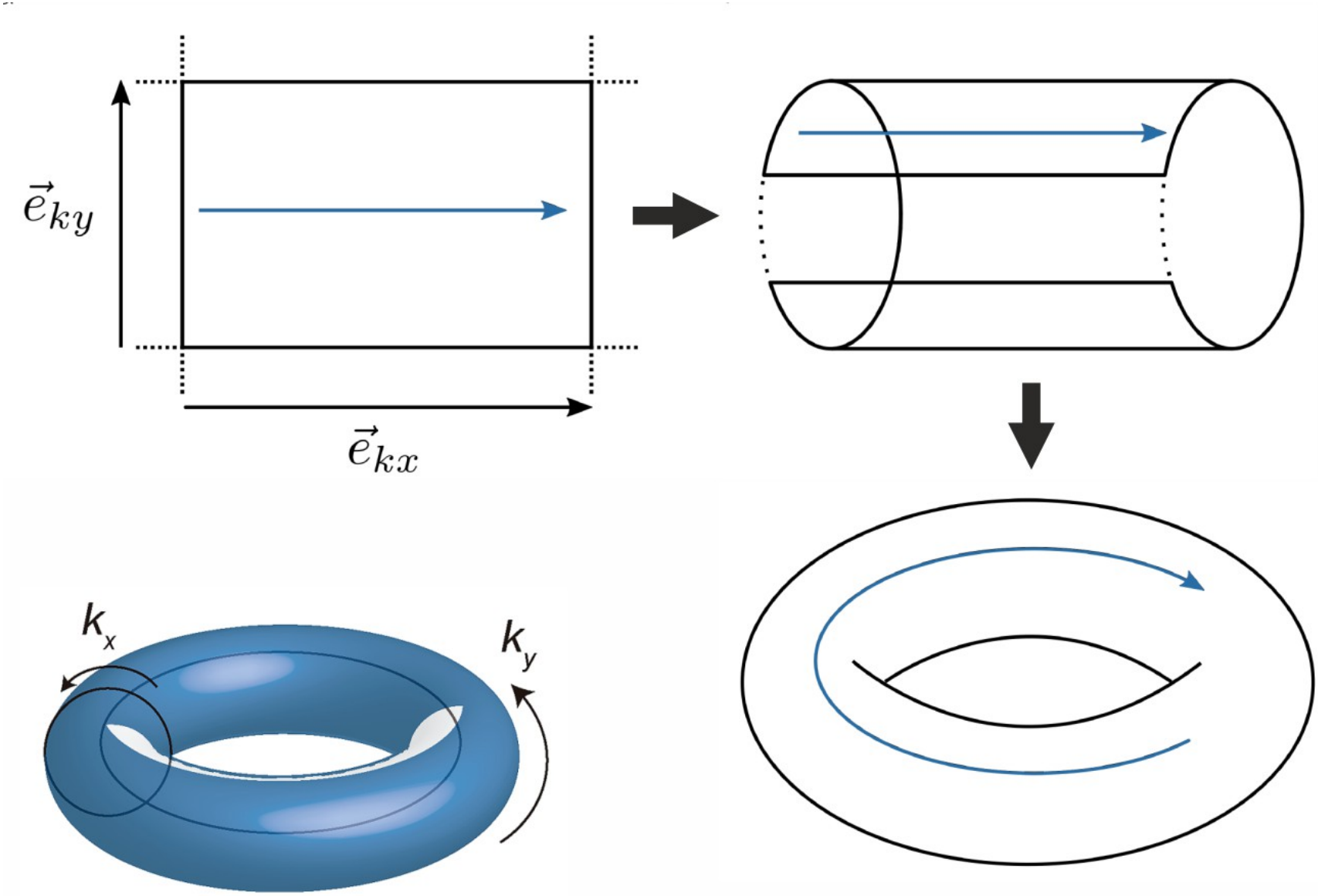
2) Berry curvature / anomalous velocity from matrix elements

Second seminar: topological insulators

Full schedule later this week...

2D Brillouin zone as torus



arXiv:2407.10464 and J. Appl. Phys. 128, 191101 (2020)