

A reminder of the powers of π

In a two-sentence Letter to the Editor of *Physical Review*, Friedrich Lenz made the noteworthy observation¹ that the value of the ratio m_p/m_e could be expressed to all significant figures of the time by $6\pi^5$. That was in 1951, and remarkably, years later the observation holds true to good approximation. His note is perhaps also the shortest article ever published in *Physical Review* (27 words, 1 number, 1 equation, and 1 reference).

Its modern version could read as follows: The most exact value at present² for the ratio of proton to electron mass is $m_p/m_e = 1836.152\,673\,89(17)$. Despite years of experimental improvements, that number still coincides, to good approximation, with the simple, unambiguous representation $6\pi^5$.

With the 66th birthday of Lenz's intriguing observation, it seems fitting to make his result better known to the community. This reminder should not be construed as trumpery—a showy but worthless statement—but as a comfort that some facts remain true with the passing of time.

References

1. F. Lenz, *Phys. Rev.* **82**, 554 (1951).
2. P. J. Mohr, D. B. Newell, B. N. Taylor, *Rev. Mod. Phys.* **88**, 035009 (2016).

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They may not be out there

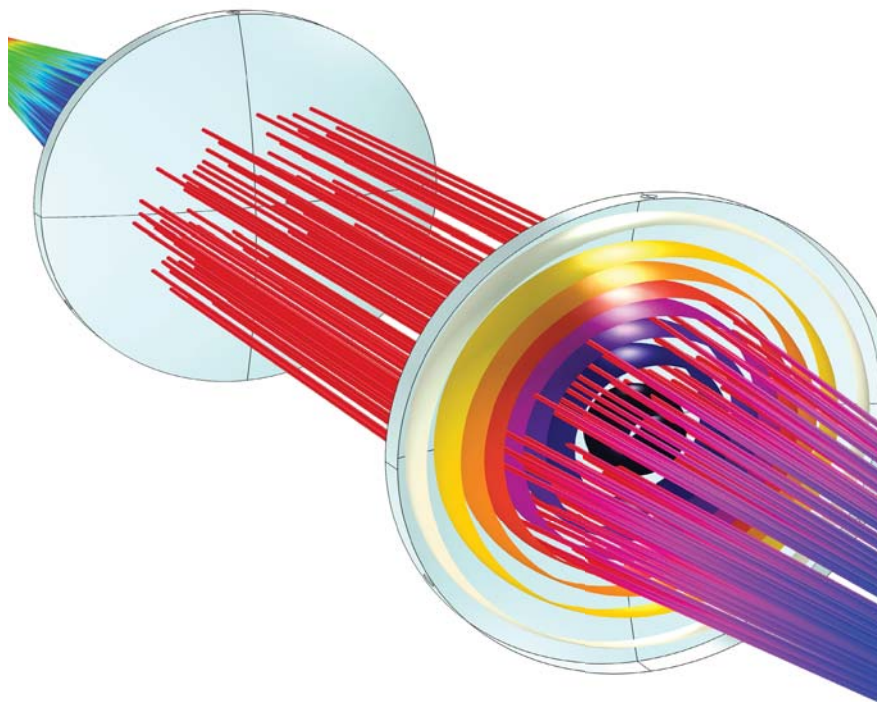
My colleagues Mario Livio and Joe Silk, in their article “Where are they?” (*PHYSICS TODAY*, March 2017, page 50), have underplayed the most straightforward answer by far to the question Enrico Fermi posed. That answer is that if they exist, they are too far away to have made it here. The universe is big and getting bigger, and the speed of light places a strict constraint on travel times. Possible signals from aliens, even if intelligence were abundant through-

out the cosmos, would typically take thousands or even millions of years to reach us—and their spacecraft would take even longer. The main conclusion to be drawn is that we will probably be unable to know for a very long time whether they even exist.

Yes, some aliens might be nearby. Earth is located in a spiral arm of the Milky Way about 25 000 light-years from the center of the galaxy, whose disk spans 100 000 light-years. More precisely, the Sun lies in a cavity of interstellar gas called the Local Bubble, which extends

over roughly 600 light-years.¹ It in turn is located in the Gould belt, a spur of stars, star clusters, and molecular clouds between two of the galaxy's spiral arms. The belt stretches to about 1200 light-years in its longest dimension. The approximate number of stars per cubic light-year in our immediate solar neighborhood is 0.004, to within a factor of two, so it holds about 30 million stars of all types.

Our earliest broadcasts have only made it out to about 100 light-years. What are the chances of chatting with alien neighbors if we wait and listen for



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