The following is a summary of information and citations relevant to our concerns about inaccurate reporting by Discover Magazine and other publications, together with necessary corrections. Prepared by Gerald A. Goldin (Rutgers University) and David H. Sharp (Los Alamos National Laboratory), January 2021.

Acknowledging the physicists who first predicted "anyons"

"Anyons" are quantum particles or excitations in two space dimensions, whose exchange statistics can be intermediate between bosons and fermions. They are associated with surface phenomena in the presence of magnetic flux.

Many important applications followed the initial theoretical predictions of anyons – early on, in explaining the quantum Hall effect; more recently, in the development of quantum computing. In 2020 experimentalists succeeded in creating such quantum excitations, resulting in considerable new publicity and attention given to these fascinating possibilities.

For those of us in theoretical physics who first predicted anyons and their physical properties, direct experimental confirmation of our work during our lifetimes is deeply satisfying. However, it is a profound disappointment that recent published accounts for general audiences, as well as earlier scientific and popular reports, omit proper acknowledgment of these early predictions.

The pattern of omissions, followed (sometimes) by little-noticed published corrections, has persisted for nearly four decades. This is very wrong. Some may think it is inappropriate for scientists to publicly demand proper recognition. But in the interest of scientific integrity and truthful reporting, we believe it is important for us to do so.

The priority of discovery is not disputed (see below). It has been acknowledged by all involved. The first published effort to set the record straight is in a detailed letter to *Physics Today* ("The Ancestry of the 'Anyon'," August 1990, pp. 90-91) by Larry Biedenharn, Elliott Lieb, Barry Simon, and Frank Wilczek, correcting the attributions in an earlier news article about anyon.

Subsequent articles in the 1990s in *Scientific American* and in *Science* likewise omitted proper attributions of the discovery. These were also followed by corrections in later issues. But the omissions nevertheless continued in both scholarly and general articles.

Most recently, *Discover* magazine omitted acknowledgment of the physicists who first predicted anyons, mentioning only, "MIT physicist Frank Wilczek, who predicted and named anyons in the early 1980s …" (article by Stephen Ornes, posted December 12, 2020 to the site: www.discovermagazine.com/the-sciences/physicists-prove-anyons-exist-a-third-type-of-particle-in-the-universe). *Quanta* magazine, in a tribute to Wilczek's impressive achievements in physics, wrote "just last year, his prediction of the "anyon: – a strange type of particle that just shows up in two-dimensional systems – was experimentally confirmed," with no mention of the prior predictions of other physicists (article by Claudia Dreifus, posted January 12, 2021 to the site: www.quantamagazine.org/frank-wilczek-cracked-open-the-cosmos-20210112/).

We ask in the interest of truthfulness that this situation be rectified. More detailed references to the original work are provided below our requests.

(1) From this point on, we ask that publications about anyons correctly and fully attribute their independent prediction to Jan M. Leinaas and Jon Myrheim (1977), and to Gerald A. Goldin, Ralph Menikoff, and David H. Sharp (1980,1981), as well as to Frank

Wilczek (1982). We ask that articles already posted on the web be corrected as necessary, to include at a minimum these attributions.

(2) We ask further that publications about the role of the braid group in anyon statistics properly credit Goldin and Sharp (1983) and Goldin, Menikoff, and Sharp (1983), where the braid group was first identified as governing the statistics of anyons.

(3) We ask that publications about anyons and fractional spin properly cite Goldin and Sharp (1983), where we demonstrated this prediction rigorously, as well as Lynaas and Myrheim (1977), Goldin, Menikoff, and Sharp (1981), and Wilczek (1982).

(4) Finally, we ask that publications about "nonabelian anyons" (also known as "plektons") properly credit Goldin, Menikoff, and Sharp (1985) as providing the first theoretical prediction of this possibility.

Thank you for your interest and consideration.

Early references predicting "anyons"

Jon M. Leinaas and Jan Myrheim (Norway) were the first to identify the theoretical possibility of intermediate quantum statistics, where the angle parameter interpolates Bose and Fermi statistics: J. M. Leinaas and J. Myrheim, *Nuovo Cimento* **37B**, 1 (1977).

Independently, our group at Los Alamos National Laboratory (USA) likewise predicted these unusual statistics: G. A. Goldin, R. Menikoff, and D. H. Sharp, *Journal of Mathematical Physics* **21**, 650 (1980), and *Journal of Mathematical Physics* **22**, 1664 (1981).

These two papers were the culmination of many years of our theoretical work, constructing rigorously and interpreting the unitary representations of current algebras and infinite-dimensional groups. They included many of the fundamental physical properties of anyons – the intermediate angle parameter, the shifted spectra for angular momentum and energy, the relation to the configuration space topology, and the connection with a charged particle circling a confined region of magnetic flux (as in the Aharonov-Bohm effect). At the time these early predictions were made, the idea seemed implausible. Before publishing, we devoted considerable effort looking for reasons to exclude this new possibility, but found none.

Frank Wilczek arrived subsequently at similar results: F. Wilczek, *Physical Review Letters* **48**, 1144 (1982), *Physical Review Letters* **49**, 957 (1982). He first termed the predicted particles "anyons," and suggested the possibility of their connection with fractional spin.

The following year, we were first to identify the braid group as the group whose one-dimensional representations describe anyon statistics: G. A. Goldin and D. H. Sharp, *Physical Review D* **28**, 830 (1983), G. A. Goldin, R. Menikoff, and D. H. Sharp, *Physical Review Letters* **51**, 2246 (1983). The role of the braid group was subsequently highlighted by Y. S. Wu, in *Physical Review Letters* **52**, 2103 (1984).

In G. A. Goldin and D. H. Sharp, *Physical Review D* **28**, 830 (1983), we provided a rigorous demonstration of the earlier conjecture by Wilczek (1982) predicting the fractional spin of anyons.

In our comment on the paper by Y.S. Wu (1984), we first noted the theoretical possibility of quantum particles or excitations associated with higher-dimensional, nonabelian braid group representations: G. A. Goldin, R. Menikoff, and D. H. Sharp, *Physical Review Letters* **54**, 603 (1985).