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Editorial

Physics Global and Local

Physics seeks natural laws that hold everywhere in the universe. Those laws should be acknowledged "even by extraterrestrials," as Max Planck put it, hence presumably should be equally recognized by every race, gender, or nationality of humankind. Yet as physics has become a global enterprise, involving every nation on Earth, interesting questions arise about the practice of physics in different cultures. In what ways might the development of physics reflect the various cultures in which it takes root? Or should we think of the endeavor of physics (not just the laws or explanations it offers) as completely independent of its social environment?

Consider the idea of "local cosmopolitanism" invoked in Somaditya Banerjee's article in this issue on the "Transnational Quantum." "By local cosmopolitanism," Banerjee writes, "I mean a synergistic cross-pollination between the localities of scientific knowledge, which is born in a specific cultural context, and the myriad strands of transnational thought." Citing Bose-Einstein statistics and bosons as examples of products of local cosmopolitanism, he continues: "Cosmopolitanism implies an interconnection between the particular and the universal, with an intellectual ethos espousing a vision of a culturally embedded global scientific consciousness."

Historians and philosophers of science have long tried to describe ways in which different cultures—disciplinary, ethnic, or linguistic—can interact. Peter Galison developed the notion of trading zones, meaning situations in which different cultures interact through developing "pidgins" or "creoles," hybrid forms of communication that operate without fully sharing a single unified culture or language.[1] Galison initially had in mind the ways in which physicists and engineers, despite their different training and "cultures," collaborated to develop radar or build particle detectors. Harry Collins and Robert Evans developed a more complex notion of trading zones as "locations in which communities with a deep problem of communication manage to communicate."[2] Others have described interdisciplinary activity in terms of cross-stimulation, clusters of specialization, and hybridization.[3] But most of these attempts approach these issues as interaction at borderlands, in which one actor or set of actors crosses a linguistic or disciplinary divide to meet and work with another.

Local cosmopolitanism implies an openness to interaction from the beginning. It allows us to understand independent, interacting participants from their own perspectives, rather than viewing them only from the standpoint of some

metropolitan center, such as that of the European physicists Bose corresponded with. Science, in this view, becomes less swapping information or crossing boundaries than participating in a community, whose shared life determines and alters its structures, rather than the other way around. Local cosmopolitanism, in short, conceives of science as never fully in the researchers' control, open from the beginning to other approaches and cultures.

Local initiatives in research (such as Bose's work) took place in the larger stream of science, sometimes fundamentally altering that stream through insights that emerged in a particular subcommunity, then percolated outward. The stories of Bose, Meghnad Saha, Chandrasekhara Venkata Raman, Cesar Lattes, and American-educated Chinese physicists told in recent issues of *Physics in Perspective* show that scientists at the peripheries, geographically, can make interventions that change the course of physics throughout the world. This is true not just because the notion of "urban center" and "periphery" is upended by the global interchange of science, but because sometimes those at the "periphery" can see possibilities and new directions at first ignored, but then embraced, by those at the "center."

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References

[1.] Peter Galison, *Image and Logic: A Material Culture of Microphysics* (Chicago: University of Chicago Press, 1997).

[2.] Harry Collins, Robert Evans, and Mike Gorman, "Trading Zones and Interactional Expertise," in "Case Studies of Expertise and Experience," ed. Harry Collins, special issue, *Studies in History and Philosophy of Science* **38**(3) (2007), 686–97.

[3.] Robert P. Crease, "Physical Sciences," in *The Oxford Handbook of Interdisciplinarity*, ed. Robert Frodeman, Julie Thompson Klein, and Carl Mitcham (New York: Oxford University Press, 2010).