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Analysis, manifolds and physics, by Yvonne Choquet-Bruhat, Cecile de Witt-Morette, and Margaret Dillard-Bleick, North-Holland, Amsterdam, The Netherlands, 1977, xviii + 544 pp., $19.50.

Physical mathematics has always been an important part of mathematics as a discipline which concerns itself with deepening and uncovering mathematical theorems by interpreting them in the light of applications to physics. Of course, in mathematics one is often faced with the challenge of putting a result in the right perspective ("what does this really mean?"), to look at it the right way; but even more so when it comes to relating the formulas to the "real world". Many an apology has been made on behalf of the cult of pure mathematics (pure almost in the sense of virgin, untouched by any reality but the mathematical), that here is where the beauty of the subject is found. This point of view is in turn still under fire from those advocating less abstraction and more solution in mathematics. I think there is an in-between, indeed I see a genuine interest in the mathematical community in applications of mathematics, in combining abstract beauty with concrete power, and even remote hopes of assisting physics in its many struggles with fields and particles.

Theoretical physics deals with building models of so-called physical systems; speaking of a physical system already breaks down the universe in two parts: the system plus a background (to the neglected or influencing the system in a given way). This jig-saw puzzle approach must add up to our given universe (the only true physical system: "les lois physiques concernent tous les mondes possibles, alors que le monde réel n'est tiré qu'à un seul exemplaire" (H. Poincaré))–a complicated verification by experimental physics.

Perhaps the system to which most attention (and success) has been devoted is that of the Hydrogen atom: a point particle moving in $\mathbf{R}^3$ under the influence of a central force field with potential $-r^{-1}$, $r = (x_1^2 + x_2^2 + x_3^2)^{1/2}$.