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### **Berry Phases and Curvatures in Electronic-Structure Theory.**

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In the last fifteen years, Berry phases have been found to play an increasingly important role in electronic-structure theory. I will briefly review some of the important developments in which Berry phases have been involved, starting with the modern theory of polarization<sup>1</sup> and the closely related theory of Wannier functions and their Wannier centers.<sup>2</sup> Next, I will discuss the theory of insulators in finite electric fields,<sup>3</sup> in which the field is taken to couple linearly to the Berry-phase polarization. I will then conclude by discussing the role of Berry phases and Berry curvatures in systems in which time-reversal symmetry has been broken, and in particular, the theory of orbital magnetization<sup>4</sup> and the anomalous Hall effect in ferromagnets.

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