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**Heineman Prize Talk: Spin Glasses Between Mathematics and Physics**

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The amount of work that has been done theoretical on spin glasses is quite large and I will concentrate on some of the main results. I will start from the physical explanation of the very slow response of many disordered systems (e.g. glasses and spin glasses). I will introduce a soluble model for spin glasses, the Sherrington-Kirkpatrick model, that generalizes the local Edwards-Anderson model in infinite dimensions. The model, where each spin is connected to all other spins, should be solved by using the appropriate mean field approximation. I will show how it can be heuristically solved using algebraic or probabilistic methods. I will briefly describe the recent rigorous mathematical proof that shows that this solution is correct. Finally I will describe the results and the problems that are present in extending the mean field theory to finite dimensions.