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The Higgs bridge: a tutorial for students and teachers[1] ROLAND ALLEN, Texas A&M University, SUZY LIDSTRÖM, Physica Scripta, Royal Swedish Academy of Sciences, Stockholm — In this talk we summarize the very broad significance of the recent Higgs boson discovery and Higgs-Englert Nobel Prize (with further discussion in R. E. Allen, Physica Scripta 89, 018001(2014)). The particle recently discovered at the Large Hadron Collider near Geneva is almost certainly this long-sought completion of the Standard Model of particle physics. But this discovery, an achievement by more than six thousand scientists (including students), is actually much more than a mere capstone of the Standard Model. It instead represents a bridge from the Standard Model to exciting discoveries of the future, at higher energies or in other experiments, and to the properties of matter at very low temperatures. The mere existence of a particle with zero spin implies a need for new physics, with the most likely candidate being supersymmetry, which requires that every known particle has a superpartner yet to be discovered. And phenomena similar to the Higgs are seen in superconducting metals and superfluid gases at low temperatures, which extend down to a millionth or even a billionth of a degree Kelvin. So the discovery of a Higgs boson has a central place in our attempts both to achieve a true understanding of Nature and to harness Nature in practical applications.

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Roland Allen
Texas A&M University

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