

Abstract Submitted  
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**Emergence and Phase Transitions** ARNOLD SIKKEMA, Trinity Western University — Phase transitions are well defined in physics through concepts such as spontaneous symmetry breaking, order parameter, entropy, and critical exponents. But emergence — also exhibiting whole-part relations (such as top-down influence), unpredictability, and insensitivity to microscopic detail — is a loosely-defined concept being used in many disciplines, particularly in psychology, biology, philosophy, as well as in physics[1,2]. I will review the concepts of emergence as used in the various fields and consider the extent to which the methods of phase transitions can clarify the usefulness of the concept of emergence both within the discipline of physics and beyond.

1. Robert B. Laughlin, *A Different Universe: Reinventing Physics from the Bottom Down* (New York: Basic Books, 2005).
2. George F.R. Ellis, “Physics and the Real World”, *Physics Today*, vol. 58, no. 7 (July 2005) pp. 49-54.

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