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# Extracting operator content of quantum and classical lattice models using lossy compression theory

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I will discuss how "relevance", as defined in the the renormalisation group (RG), is in fact equivalent to the notion of "relevant" information defined in the Information Bottleneck (IB) formalism of compression theory, and how order parameters and, more generally, scaling operators are solutions to a suitably posed compression problem. These solutions can be numerically obtained from raw configurations of the system using methods of contrastive learning. We construct an algorithm whose outputs are neural nets parametrising the scaling operators, with which information about the phase diagram, correlations and symmetries (also emergent) can be obtained. I will show how these tools applied to lattice gauge theories, and systems on irregular graphs can already shed light on open problems.

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