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Advances Research in High-Throughput MgB_2 Superconductivity

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Abstract: *Superconducting materials find applications in a rapidly growing number of technological areas, and searching for novel superconductors continues to be a major scientific task. However, the steady increase in the complexity of candidate materials presents a big challenge to the researchers in the field. In particular, conventional experimental methods are not well suited to efficiently search for candidates in compositional space exponentially growing with the number of elements; neither do they permit quick extraction of reliable multidimensional phase diagrams delineating the physical parameters that control superconductivity. New research paradigms that can boost the speed and the efficiency of superconducting materials research are urgently needed. High-throughput methods for rapid screening and optimization of materials have demonstrated their utility for accelerating research in bioinformatics and pharmaceutical industry, yet remain rare in quantum materials research. In this paper, we will briefly review the history of high-throughput research paradigm and then focus on some recent applications of this paradigm in superconductivity research. We consider the role these methods can play in all stages of materials development, including high-throughput computation, synthesis, characterization, and the emerging field of machine learning for materials. The high-throughput paradigm will undoubtedly become an indispensable tool of superconductivity research in the near future.*

Keywords: Superconductivity, High Throughput, Machine Learning, Combinatorial Film, Rapid Screening

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