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# Literature Review

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## Particle Identification in Modern Cherenkov Detectors

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### Abstract

With major detector assemblies lining up for construction at high-energy facilities such as EIC, technologies for particle identification are becoming ever more relevant. This review motivates the theory of the field, introduces the technologies behind modern Cherenkov detectors, and discusses the implementation of these detectors into upcoming experiments. Emphasis is placed on ..... Persistent challenges include ..... We conclude by outlining promising future developments for .....

*Keywords:* Particle Identification, Cherenkov Detectors, DIRC, RICH, PANDA, EIC, GSI

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## References

- [1] B. Singh, W. Erni, B. Krusche, M. Steinacher, N. Walford, B. Liu, H. Liu, Z. Liu, X. Shen, C. Wang, et al., Journal of Physics G: Nuclear and Particle Physics **46**, 045001 (2019).