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DarkSHINE: A fixed-target search for dark photon at the SHINE facility

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DarkSHINE is a proposed fixed-target experiment at SHINE aimed at searching for sub-GeV dark-sector mediators and light dark matter.
Its baseline target is an invisibly decaying dark photon ($A' \to \chi\chi^-$) produced in high-intensity electron–nucleus interactions, observed through a missing-energy/momentum signature.
We present the experimental concept, baseline detector design, and a first prospective sensitivity study.
We also report recent R&D progress and discuss future extensions, including a positron-beam mode. DarkSHINE will be complementary to NA64 and LDMX experiments.

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