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Recent Progress of DarkSHINE R&D

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DarkSHINE is a fixed-target experiment initiative to search for light Dark Matter and mediators at SHINE (Shanghai high repetition rate XFEL and extreme light facility, being the 1st hard X-ray FEL in China) under construction targeting completion in 2025/2026. DarkSHINE aims to search for the new mediator, Dark Photon, bridging the Dark sector and the ordinary matter. In this contribution, we present the idea of this new project and 1st prospective study in search for Dark Photon decaying into light dark matter as well as the very recent technical R&D progresses. It also provides the opportunity to incorporate broader scope of BSM search ideas such as ALP / Anomalous Muonium / LLP / etc. and electron/photon/neutrino-nuclear interaction product measurements, utilizing the fixed-target experiment of this type. Also in the future, DarkSHINE experiment has the great potential to be upgraded into positron beam mode and search for Dark Photon via more production channels through s/t-channel annihilations. Last but not least, DarkSHINE will likely provide cross-reference experimental DATA together with future LDMX experiment, the continued NA64 experiment, etc. to become part of the global efforts for accelerator based Dark Matter searches.

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