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Probing dark sectors with enhanced long-lived particles at the LHC

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Long-lived particles provide a unique probe for dark sectors. The searches for such signatures are challenging at the LHC. In comparison with the light Standard Model particles, the decay
products of massive LLPs arrive at detectors with time delay around the nanosecond scale. We propose new strategies to take advantage of this time delay by using initial state radiation jets to timestamp the collision event and subsequently require at least one LLP to decay within the detector volume. This search strategy can be effective for a broad range of models.

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