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Flavourful Z portal for vector-like neutrino Dark Matter and $R_{K^{(*)}}$

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We discuss a flavourful Z' portal model with a coupling to fourth-family singlet Dirac neutrino dark matter. In the absence of mixing, the Z is fermiophobic, having no couplings to the three chiral families, but does couple to a fourth vector-like family. Due to mixing effects, the Z′ gets induced couplings to second family left-handed lepton doublets and third family left-handed quark doublets. This model can simultaneously account for the measured B-decay ratios R_K and R_{K^*} and for the observed relic abundance of dark matter. We identify the parameter space where this explanation is consistent with existing experimental constraints from dark matter direct and indirect detection, LHC searches, and precision measurements of flavour mixing and neutrino processes.

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