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A Generalised Missing Partner Mechanism for $SU(5)$ GUT Inflation

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We generalise the Missing Partner Mechanism to split the electron-like states from the coloured ones of vector-like $SU(5)$ 10-plets. Together with the extra light weak doublets from the Double Missing Partner Mechanism (DMPM), this realises gauge coupling unification in the presence of a light weak triplet and colour octet - the characteristic light relics from the adjoint in $SU(5)$ GUT inflation models - without fine-tuning. Additionally, we show how the vector-like 10-plets may generate realistic fermion masses while the DMPM ensures that dimension five nucleon decay is suppressed. A discovery of the light relic states at future colliders would provide a “smoking gun” signal of the scenario.

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