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8π -periodic Josephson effects in a quantum dot / quantum spin-Hall Josephson junction system¹ HOI-YIN HUI, CMTC, Univ of MD, College Park, JAY SAU, CMTC and JQI, University of Maryland — Josephson junctions made of conventional s -wave superconductors display 2π periodicity. On the other hand, 4π -periodic fractional Josephson effect is known to be a characteristic signature of topological superconductors and Majorana fermions [1]. Zhang and Kane have shown that Josephson junctions made of topological superconductors are 8π -periodic if interaction is used to avoid dissipation [2]. Here we present a general argument for how time-reversal symmetry and Z_2 non-trivial topology constrains the Josephson periodicity to be 8π . We then illustrate this through a microscopic model of a quantum dot in a quantum spin-hall Josephson junction.

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