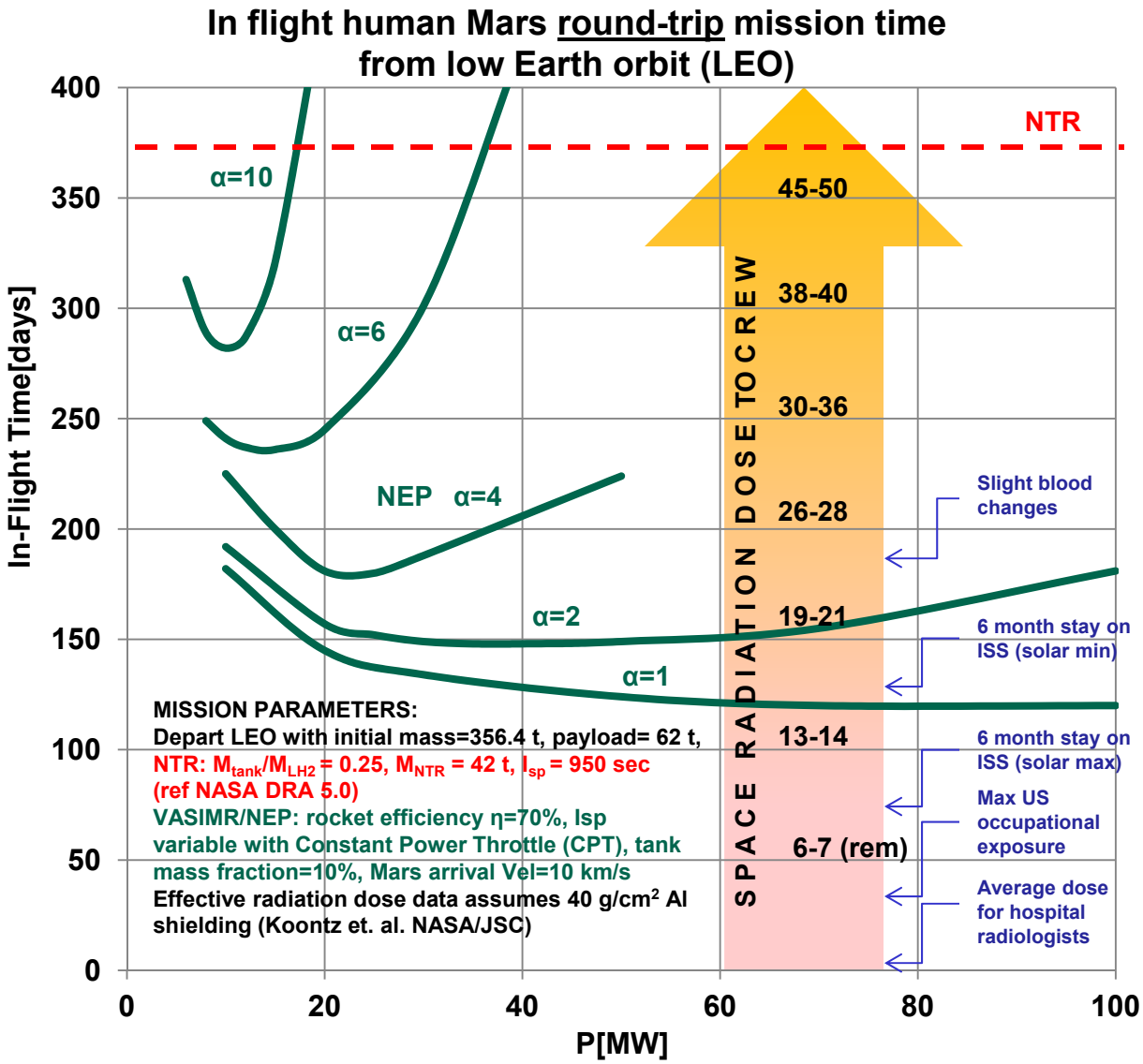
How Fast Could (Should) We Go to Mars?

Comparing Nuclear Electric Propulsion (NEP) with the Nuclear Thermal Rocket (NTR)



DESCRIPTION. Reducing the round-trip in-flight time on a human mission to Mars reduces the radiation dose to the crew (vertical arrow), which increases with trip time. The green curves show the total round-trip in-flight time vs the NEP rocket's power for various values of α ranging from 1 to 10 (α is a measure in kg/kW of how "light" the nuclear reactor and engine package could be). For each α there is a minimum trip time and a corresponding power level that satisfies the mission requirements. The horizontal red dashed line shows round-trip time using an NTR. Nuclear electric space reactors with α <10 do not yet exist, but compelling designs have been proposed by recognized experts worldwide (ref1). These must be developed to enable fast missions to Mars and a robust human exploration of the solar system. (Source: Ad Astra Rocket Company, October, 2012).

ref 1: **Multi-MW Closed Cycle MHD Nuclear Space Power Via Nonequilibrium He/Xe Working Plasma;**
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