[mex223] Photon rocket

When a conventional rocket is launched from rest in a force-free environment, it acquires the speed $v_c = u \ln(m_i/m_f)$, where m_i is the initial mass, m_f the final mass, and u the speed of the exhaust gases relative to the rocket (see [mex17]).

Now calculate the speed v_p which a rocket acquires if the difference between its initial rest mass m_i and its final rest mass m_f is converted into radiant energy.

Solution: