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function Slam=planck(lam)
% input a vector of lambdas, and compute a corresponding vector
% of values of the planck function S_lambda (dL/dlambda)
% for blackbody at temp T=5800 kelvin (i.e. the sun)
% this function will be passed to "quad" as below for integration
% lam (lambda) given in meters so
% visible range is 0.0000004 - 0.0000007 meters
% vis + NIR is 0.0000004 - 0.0000012
% solar range is (appx) 1x10^(-7) - 1x10^(+2)
% this function can be numerically integrated between two wavelength limits
% by calling matlab function quad(@bb,lam1,lam2)
% that function does adaptive simpson quadrature until integral does not
% change by more than 1e-06, or by an input tolerance parameter
% S_lambda = (2hc^2) / (lamba^5 * (exp(hc/(lambda*k*T)) - 1)

T=5800;                 % temp, deg. kelvin
h=6.6261e-34;           % planck's constant Js
k=1.3807e-23;           % boltzmann's constant Jk^-1
c=2.9979e8;             % speed of light m/s
sig=5.6705e-8;          % stefan-boltzmann constant Wm^-2K^-4 (not used here)

% must use vector operations because vector in / vector out
num=2*h*c^2;
term=(h*c)./(lam*k*T);
den=lam.^5 .* (exp(term) - 1.0);
rad=num./den;
Slam=rad;
```