

Nov 10, 17 14:12

sol32.txt

Page 1/1

Solar system: Schwarzschild radius, ruler and radar distance.

```

c [m/s]      = 0.2998E+09    speed of light
G [m^3/(kg*s^2)] = 0.6674E-10  gravitational constant
y [s]        = 0.3154E+08    year
ly [m]       = 0.9454E+16    light year xly
sm [kg]      = 0.1989E+31    mass of the sun
sr [m]       = 0.6957E+09    radius of the sun
rl [m]       = 0.1496E+12    distance earth-sun = 1 astronomical unit [au]

```

```

sg [m/s^2]    = 274.2 = G*sm/sr^2 sun surface gravitational acceleration

```

```

(a) Sun Schwarzschild radius rs [m] = 2953.3
    rs/sr [dimensionless]           = 0.4245E-05

```

Units of coice c=G=1 and everything in seconds:

```

meter [s]      = 0.3336E-08    = xm [s]
kg [s]         = 0.2477E-35    = xkg [s]
sg [s]         = 0.9147E-06    grav acceleration
cg [m/s^2]     = 274.2        back conversion
sm [s]         = 0.4925E-05    sun mass sam
sr [s]         = 2.321        sun radius sar
2*sm/sar [dimensionless] = 0.4245E-05

```

(b) Coordinate and ruler distance:

```

dr [s]         = 496.6787859    coordinate distance
dl [s]         = 496.6788123    ruler distance
drul [s]       = 0.0000265     = dl-dr = 0.265E-04
Conversion to meter:
dr [m]         = 0.1489043000E+12 coordinate distance
dl [m]         = 0.1489043079E+12 ruler distance
drul [m]       = 7930.7        = dl-dr

```

(c) Radar distance:

```

tdil [s]       = -0.9870E-08    dilation fraction
fdil [s]       = 0.9999999901    dilation factor
2*drul [s]     = 0.0000529
R [s]          = 496.6788339    radar distance
drad [s]       = 0.0000480     = R-dr = 0.480E-04
                fdil factor accounts for 2*drul-drad = 0.490E-05
dradl [s]      = 0.0000216     = R-dl = 0.216E-04
                radar distance R is larger than the others
Conversion to meter:
R [m]          = 0.1489043144E+12 radar distance
drad [m]       = 14391.6        = R-dr
dradl [m]      = 6460.9         = R-dl

```