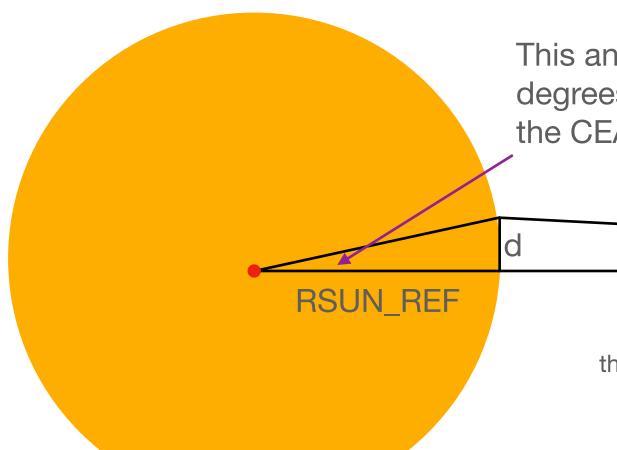
## Converting CDELT1 from degrees in CEA coordinates to arcseconds



This angle is the projected value of CDELT1 in degrees, which is the CDELT1 value provided in the CEA coordinate system. Let's call this  $\alpha$ .

We want this angle, or the angle subtended on the Sun in arcseconds as observed by the spacecraft. This is the value of CDELT1 in arcseconds. Let's call this  $\beta$ .

DSUN OBS

(note that DSUN\_OBS is defined as the distance from the spacecraft to the Sun center, but DSUN\_OBS - RSUN\_REF is the same as DSUN\_OBS within 0.4% so it doesn't affect our calculation of CDELT1 in arcseconds)

RSUN\_REF is the solar radius

DSUN\_OBS is the distance from the solar surface to the spacecraft (could be SDO or SoHO). d is the length of a pixel

The red dot is the center of the Sun. The blue dot is the spacecraf. This is not to scale!

## Step 1: Determine d

sin α = (d/RSUN\_REF)
make a small angle approximation
α = d/RSUN\_REF
α \* RSUN\_REF = d

Note that a is in degrees.

Step 2: Determine CDELT1 in arcseconds

tan  $\beta$  = ( $\alpha$  \*  $\pi$  /180 \* RSUN\_REF) / (DSUN\_OBS)  $\beta$  = arctan [( $\alpha$  \*  $\pi$  /180 \* RSUN\_REF) / (DSUN\_OBS)]

This gives  $\beta$  in radians.

To convert  $\beta$  from radians to arcseconds, multiply by  $(180/\pi)^*3600$ :  $\beta = \arctan [(\alpha * \pi /180 * RSUN_REF) / (DSUN_OBS)]^*(180/\pi)^*3600$