Spirale model documentation:

- **Type of section**: type of elements to fill the spiral.

Description: The spiral is composed of individual elements along the Archimedean spiral. This different element type corresponds to different hypothesis of dust nucleation locations (see Fig. 1).

Case 1: If the dust is formed at the shock interface of the wind, the spirale with be empty and the spirale elements are thin rings.
Case 2: If the dust is formed in a non-preferred region, the spiral will be full, and the spiral elements are thin disk.
Case 3: The last elements (i.e. gaussian disk), can form a full spiral but with a non-sharp spiral wall

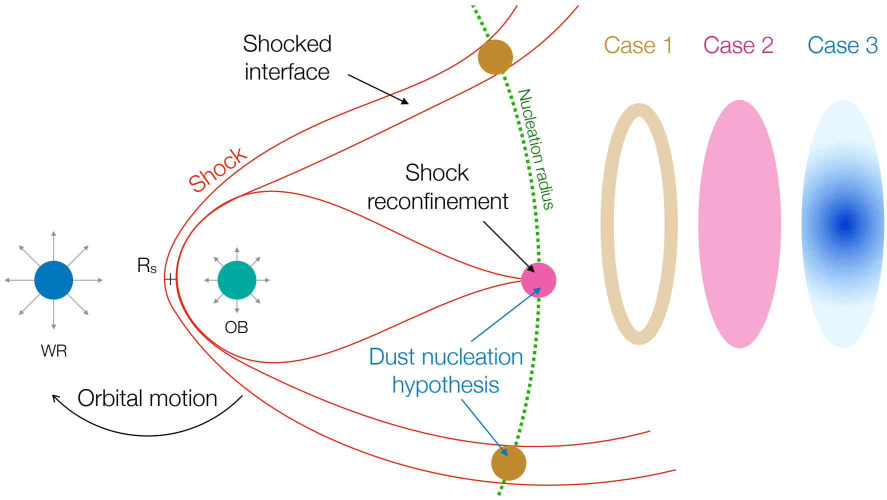
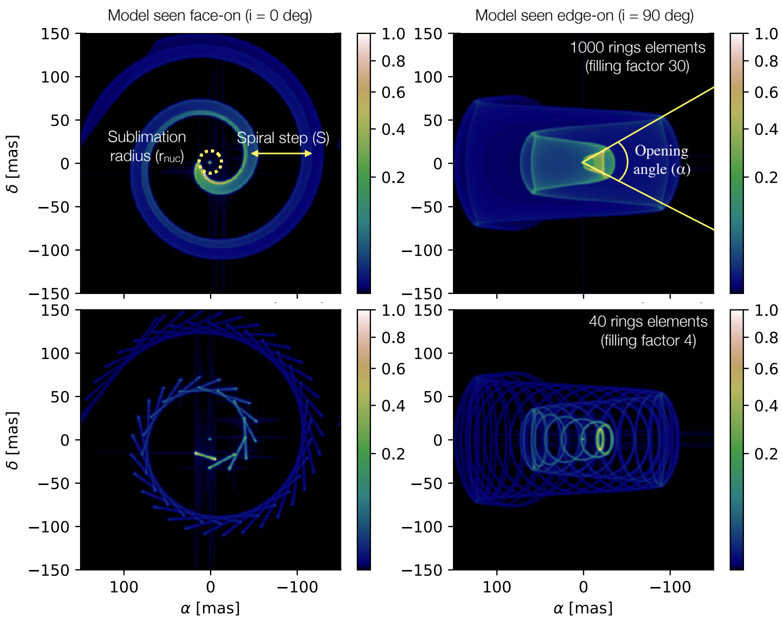


Fig. 1: Dust nucleation hypothesis. The case 1 corresponds to a dust nucleation occurring in the shocked interface (brown case, ring elements). The case 2 corresponds to a dust nucleation occurring at the shock reconfinement (pink case, disk elements). The case 3 corresponds to a non-uniform dust production with gaussian wall.

- **Filling factor:** factor to tune the number of elements described before. As high this number is, more elements are added. Values: default 20, [5-100]. Warning: increase this number can increase a lot the time computing (see Fig. 2).

Fig. 2: Example of spiral model. Relevant parameters are represented. Spiral step S, dust nucleation radius (r_{nuc}), opening angle (α) and the effect of the filling factor.



- **Number of spiral turns:** Number of spiral coils corresponding to the number of orbital periods. Value [>= 0]

- **Opening angle (α):** Angle corresponding to the opening angle of the shock cone (This angle can be visible when the spiral is seen edge-on). Values [0-180 deg].

- **Spiral step (S) :** Angular spacing between consecutive coils. This parameter is a combination between the terminal wind speed of the Wolf-Rayet star (assimilated to the dust launch velocity, **v_{dust}**), the orbital period (**P**) of the binary and the astrometrical distance (**D**). Value [>= 0 mas]

$$\frac{\mathrm{S}}{[\mathrm{mas}]} = \mathrm{K} \times \left(\frac{\mathrm{v_{dust}}}{[\mathrm{km/s}]}\right) \times \left(\frac{\mathrm{P}}{[\mathrm{days}]}\right) \times \left(\frac{[\mathrm{kpc}]}{\mathrm{D}}\right)$$

Where, is a constant (K = (24x3600)/(1 AU [km]) = 5.779e-4) computed to use appropriate units.

- **Inclination angle:** Inclination of the spirale. E.g.: a spirale seen face-on can rotate counter-clockwise [i = 0 deg] or clockwise [i = 180 deg]. Values [0-360 deg].

- **Phase angle:** Orientation of the spirale along its orbit. Value [0-360 deg].

- **Binary-spiral separation (r_sub):** Angular separation between the start of the spiral (position of the first elements) and the binary star. This value represents the dust sublimation radius inside where the dust cannot survive. Value [>= 0 mas].

- **Binary angular separation:** Angular separation between the two stars (WR and OB stars). Value [>= 0 mas].

- **Dust sublimation temperature (T_sub at r_sub):** Temperature at the dust nucleation radius (i.e.: the blackbody temperature of the first element). This value is usually set as the carbon dust sublimation temperature (2000 K) or silicates (1500 K). Value [>= 0 K].

- **Coefficient of dust decrease:** Decreasing index used to represent the temperature law fallowed by each elements of the spiral, where each elements are assimilated to blackbodies. Value [0-1]

- **Spiral flux decrease factor from shadowing:** Decreasing factor used to represent a shadowing effect occurring after the first coil (i.e.: the outer turns are not directly illuminated by the stars and are in the shadow of the first coil). Value [>= 0].

- **Teff of WR star:** Effective temperature of the Wolf-Rayet star used to compute the SED of the binary (as blackbody). Value [>= 0 K].

- **Teff of OB star:** Effective temperature of the companion star used to compute the SED of the binary (as blackbody). Value [>= 0 K].

- **Luminosity ratio:** Flux ratio between the OB star and the WR star defined at 0.55 microns. Value [> 0]. A luminosity ratio of 2 corresponds to F_{OB} [0.55μm] = 2 x F_{WR} [0.55 μm]. Value [> 0].

- **Binary-spiral flux ratio:** Flux ratio between the binary and the spiral set at 1 micron. A binary-spiral ratio of 2 corresponds to F_{spiral} [1 μm] = 2 x F_{binary} [1 μm]. Setting this parameter to zero turn off the spiral emission. Value [> 0].

- **SED scale factor:** Scaling factor to set the SED of the spiral at a realistic level. This factor is a combination of the astrometric distance and the equivalent size of the dust emission. Value [> 1]