wave is: $\left|\tilde{\psi}_{tot}\left(x, y=0, z, t\right)\right| = \sqrt{2}A\sqrt{1+\cos\Delta\varphi_{21}\left(x, y=0, z, t\right)}$, and thus when: $\cos\Delta\varphi_{21}\left(x, y=0, z, t\right) = +1$, *i.e.* when $\Delta\varphi_{21}\left(x, y=0, z, t\right) = 0, \pm 2\pi, \pm 4\pi, \pm 6\pi ... = \pm n_{even}\pi$, n_{even} = 0, 2, 4, 6, … the total/resultant plane wave will be maximal (i.e. constructive interference of the two counter-propagating traveling waves): $\left|\tilde{\psi}_{tot}\left(x, y=0, z, t\right)\right| = 2A$, but when $\cos\Phi\left(\vec{r}, t\right) = -1$, *i.e.* when $\Delta\varphi_{21}\left(x, y=0, z, t\right) = \pm 1\pi, \pm 3\pi, \pm 5\pi ... = \pm n_{even}\pi$, n_{odd} = 1, 3, 5, 7, … the total/resultant plane wave will be minimal, (i.e. destructive interference of the two counter-propagating traveling waves): $\left|\tilde{\psi}_{tot}\left(\vec{r}, t\right)\right| = 0$.

<u>In terms of phasor diagrams</u>:

Maximal/constructive interference occurs when the relative phase $\Delta\varphi_{21}$ of the two counter-propagating traveling waves is an ***<u>even</u>*** integer multiple of 2π, *i.e.* 360°, such that the two individual amplitudes add linearly together, because they are precisely in-phase with each other, as shown in the figure below, at time t = 0:

$$\tilde{\psi}_{tot}\left(x, y=0, z, t=0\right) = 2A$$

$$\tilde{\psi}_1\left(x, y=0, z, t=0\right) = A \qquad \tilde{\psi}_2\left(x, y=0, z, t=0\right) = A$$

Minimal/destructive interference occurs when the relative phase $\Delta\varphi_{21}$ of the two counter-propagating traveling waves is an ***<u>odd</u>*** integer multiple of π, *i.e.* 180°, such that the two individual amplitudes completely cancel, because they are in precisely out-of-phase with each other, as shown in the figure below, at time t = 0:

$$\tilde{\psi}_{tot}\left(x, y=0, z, t=0\right) = 0$$

$$\tilde{\psi}_1\left(x, y=0, z, t=0\right) = A \qquad \tilde{\psi}_2\left(x, y=0, z, t=0\right) = -A$$

When the relative phase difference $\Delta\varphi_{21}\left(x, y=0, z, t\right) = \varphi_2\left(x, y=0, z, t\right) - \varphi_1\left(x, y=0, z, t\right)$ is anywhere in between these special points, *i.e.* $n_{odd}\pi < \Delta\varphi_{21} < n_{even}\pi$, then only partial/incomplete interference occurs, and the phasor diagram in the complex plane at time t = 0 will in general be something like that shown in the figure below: