What has been done.

Zihua Su

How i understand the code:

- CUPRAD ----> IR propagation in the medium

$$\partial_z U = \frac{\mathbf{i}}{2k_0}\mathcal{T}^{-1}\triangle_\perp U + \mathbf{i}\mathcal{D}_2 U + \mathbf{i}\frac{\omega_0}{c}n_2\mathcal{T}|U|^2U - \frac{\mathbf{i}e^2k_0}{2n_0^2\omega_0^2m_e\varepsilon_0}\mathcal{T}^{-1}\left(\varrho_e U\right) - \frac{e^2\nu_e}{2m_e\varepsilon_0 n_0 c\left(\nu_e^2+\omega^2\right)^2}\varrho_e U$$

- TDSE -----> Dipole at each points in the medium

$$H_L^{(1\mathrm{D})} = -\frac{1}{2}\frac{\mathrm{d}^2}{\mathrm{d}x^2} - \frac{1}{\sqrt{a^2+x^2}} + \mathcal{E}(t)x$$

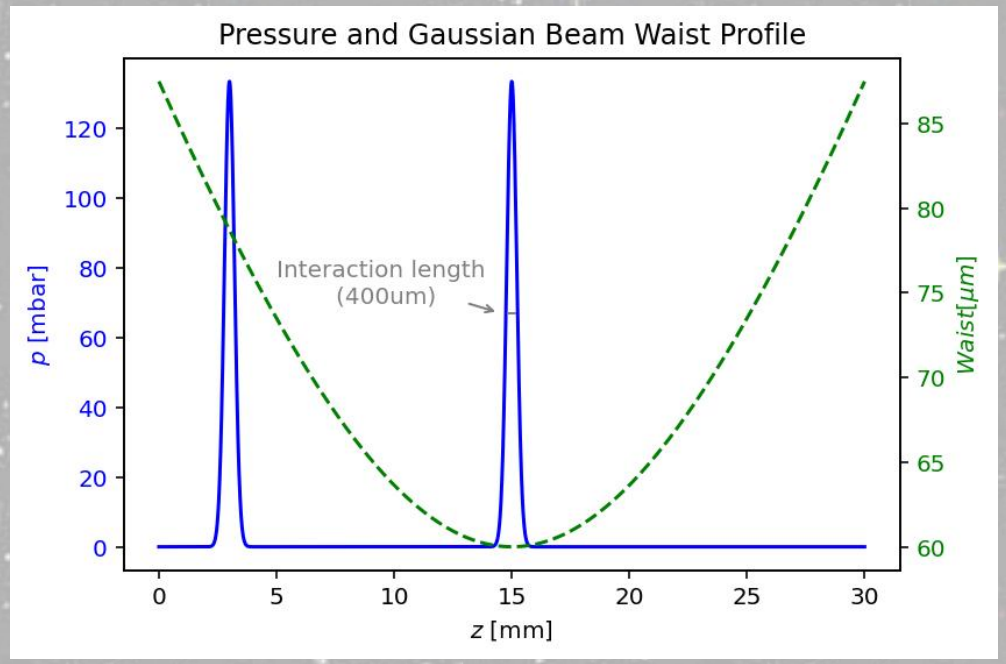
- Hankel ----> XUV in the far field

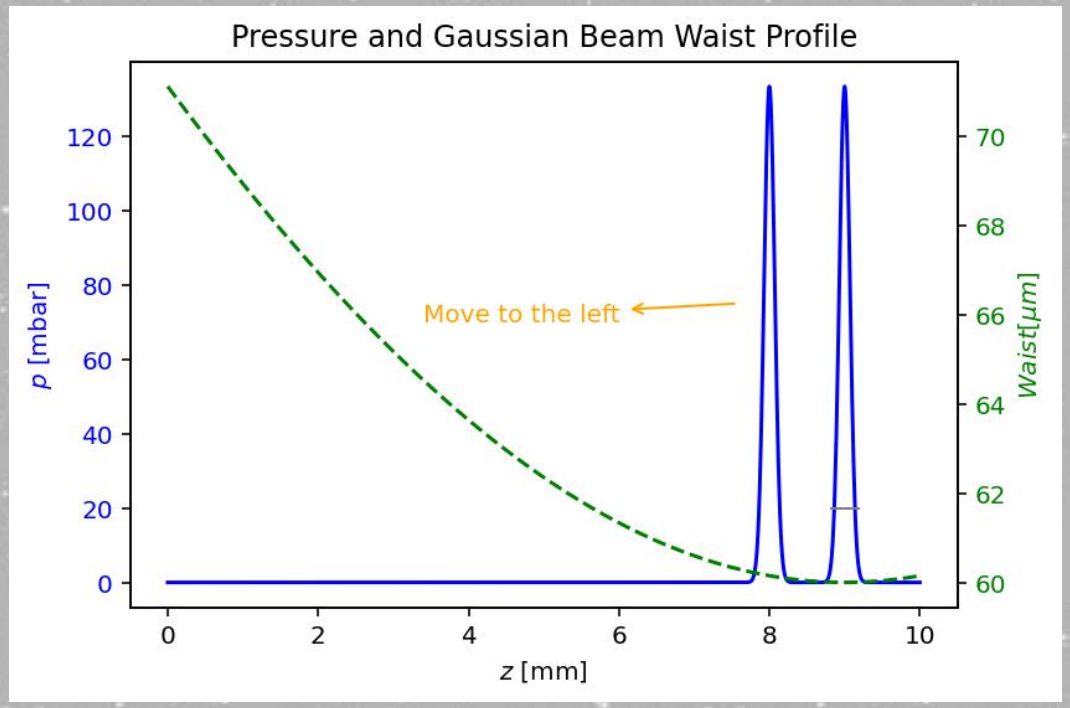
$$\hat{\boldsymbol{\mathcal{E}}}(\omega,\rho,z) \approx -\frac{\mu_0 \mathrm{e}^{\mathbf{i}k(\omega)z}}{4\pi}\int_{z_{\mathrm{entry}}}^{z_{\mathrm{exit}}}\frac{\mathrm{e}^{-\mathbf{i}k(\omega)z'}\mathrm{e}^{\mathbf{i}\frac{k(\omega)\rho^2}{2(z-z')}}}{z-z'}\int_{\Delta_T}\mathrm{e}^{\mathbf{i}\frac{k(\omega)(\rho')^2}{2(z-z')}}\widehat{\left(\frac{\partial \boldsymbol{j}_Q}{\partial t}\right)}J_0\left(\frac{k(\omega)\rho\rho'}{z-z'}\right)\rho'\,\mathrm{d}\rho'\,\mathrm{d}z'\,.$$

noabsorbtion considered in the second jet?

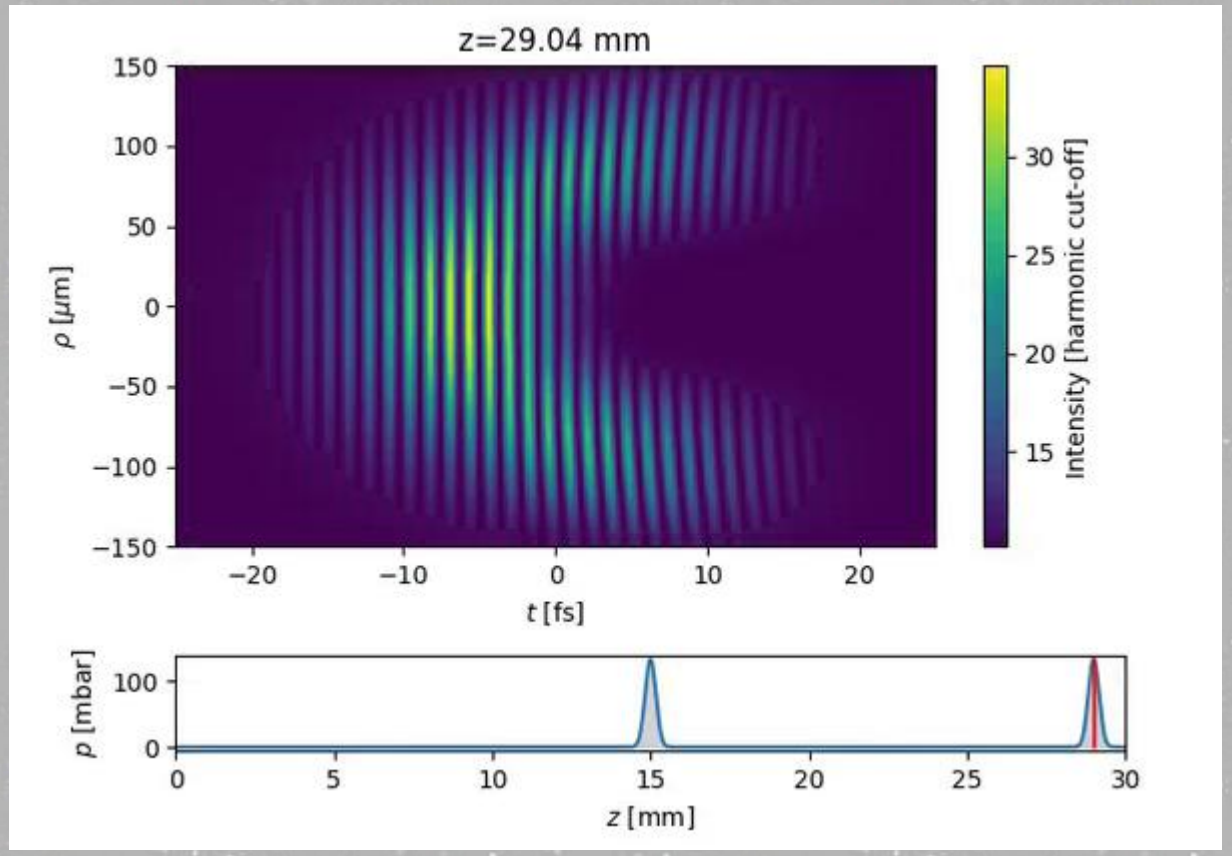
Main Inputs for our purpose

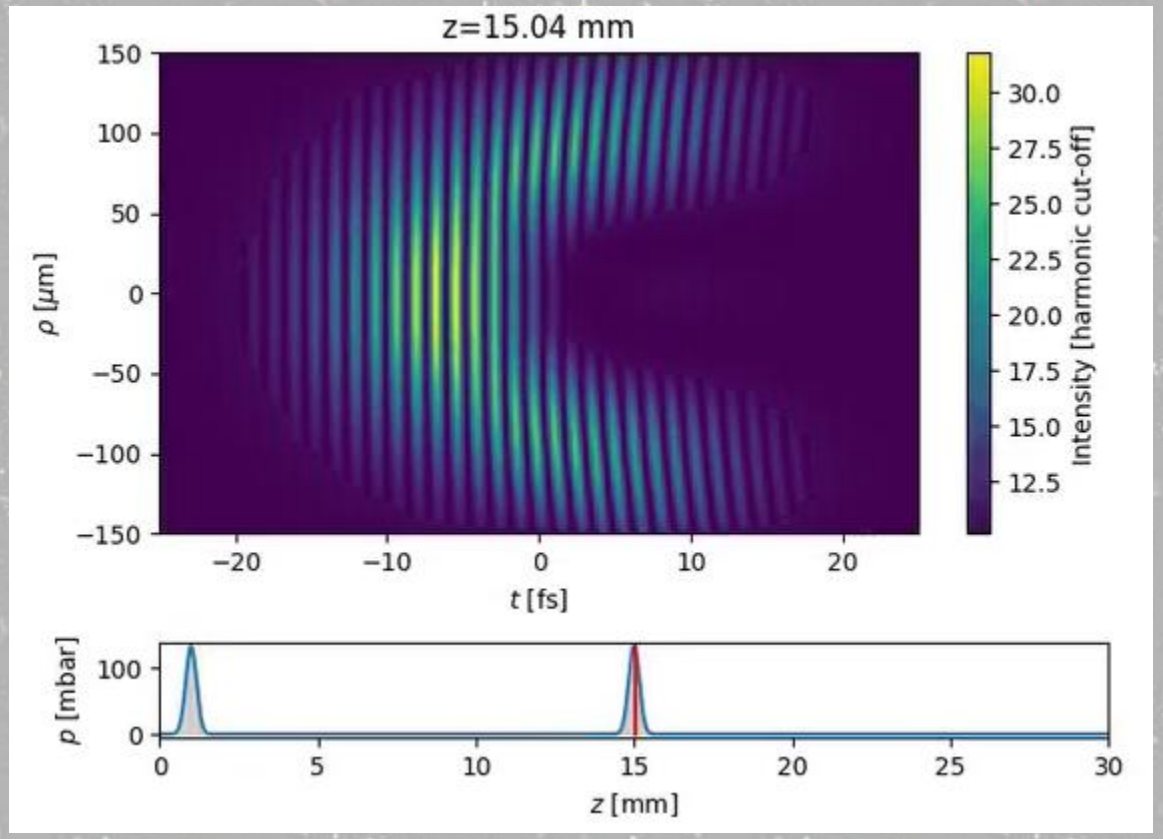
- Medium (Gas, Length, pressure profile)
- Laser (Waist, duration, focus position)





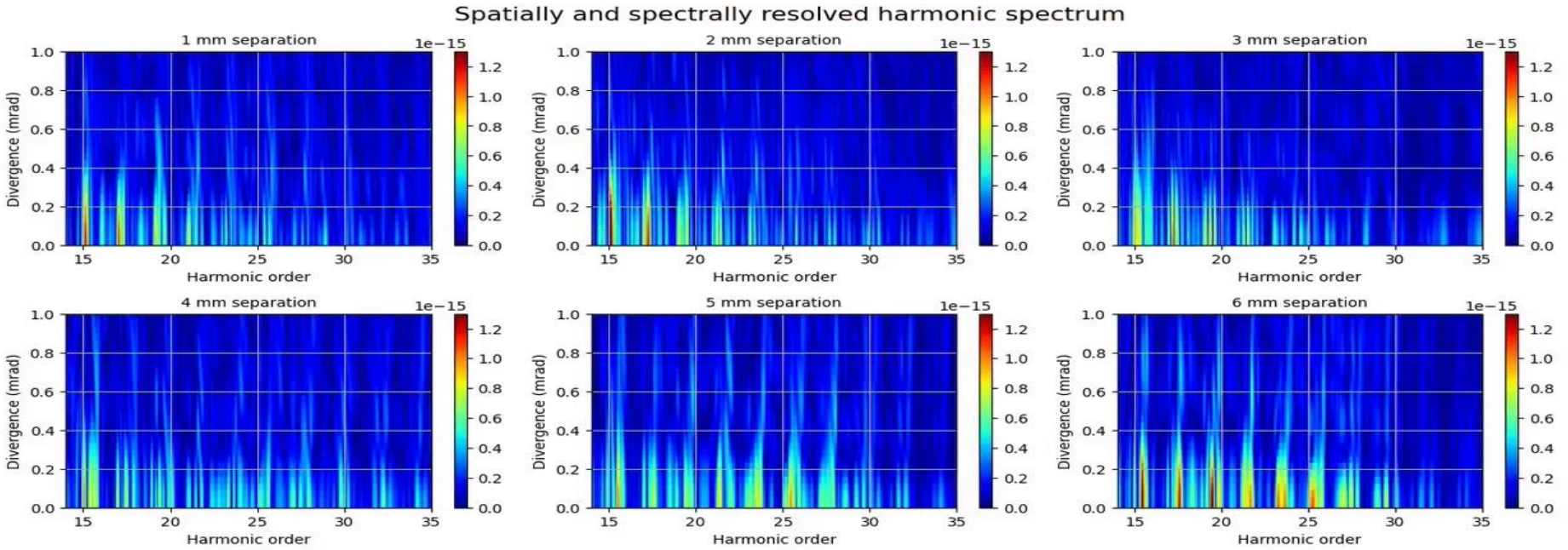
- Dicretization in r and z
- (Computational time)
  (z_step always ~10μm)
- (r_step=10, Nr_max=200)

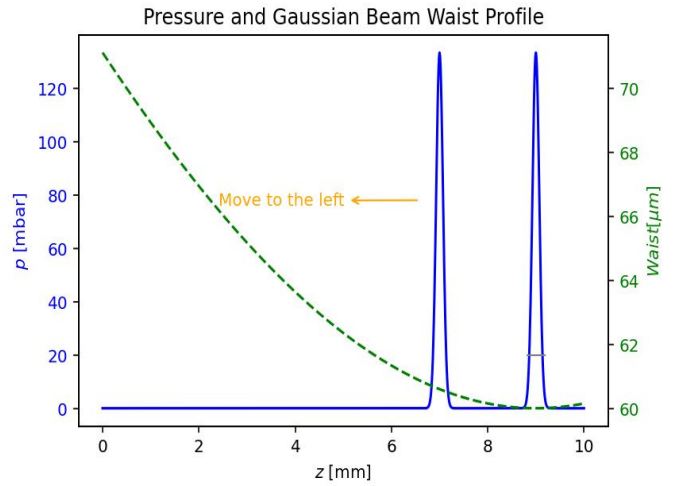




Because I want to reduce the medium length for saving time.

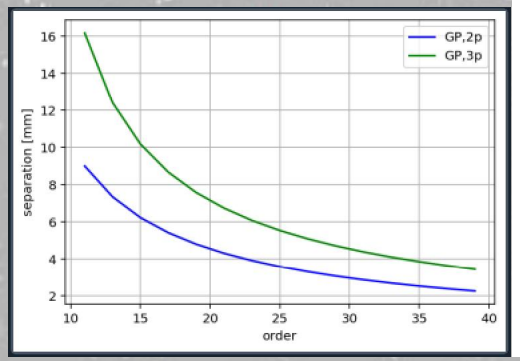
I don’t know whether they put the focus in the middle on purpose.
So I gave some small run parameters and put the focus in different position to test whether the pulse remain the same.

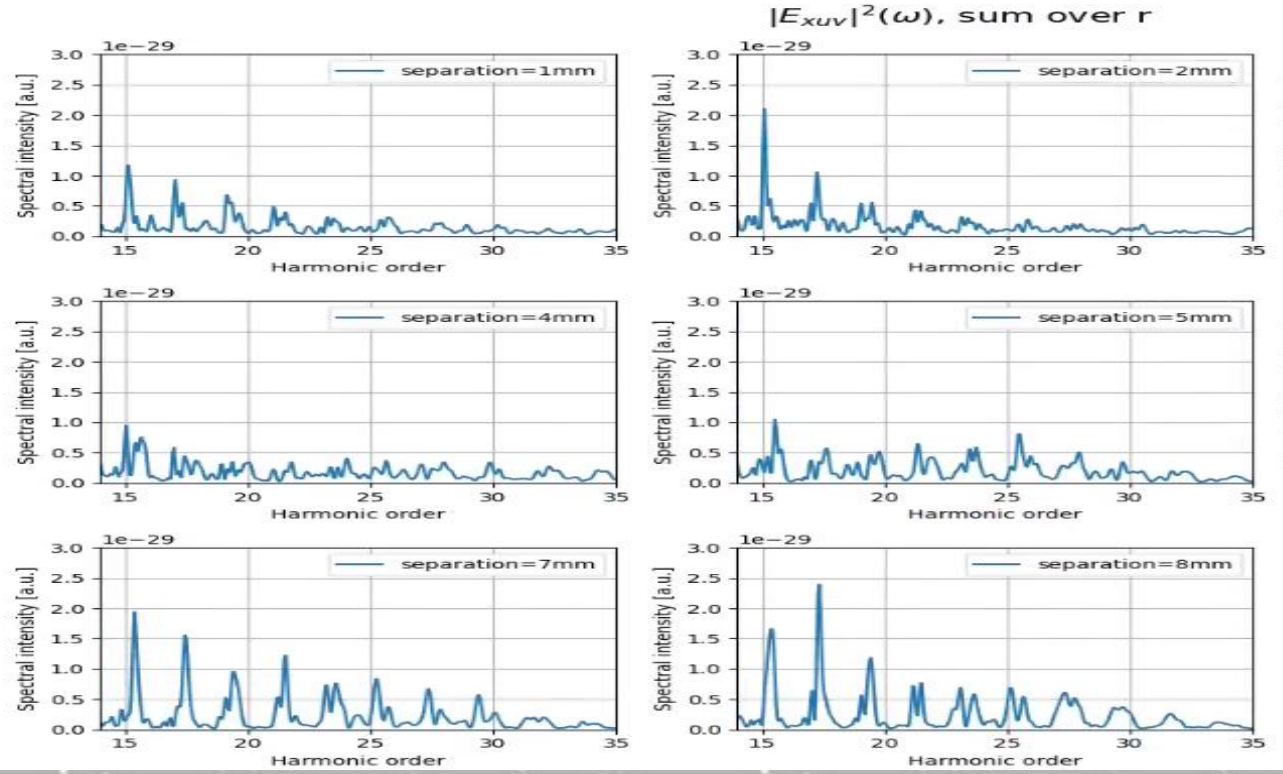




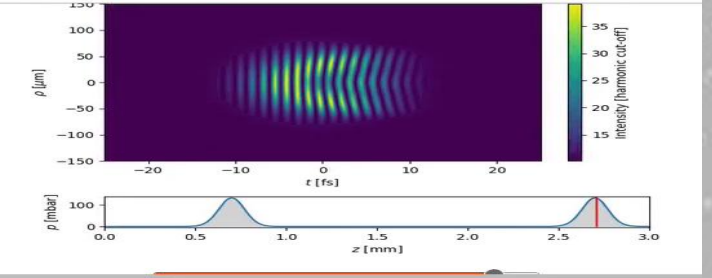
(no residual pressure.)

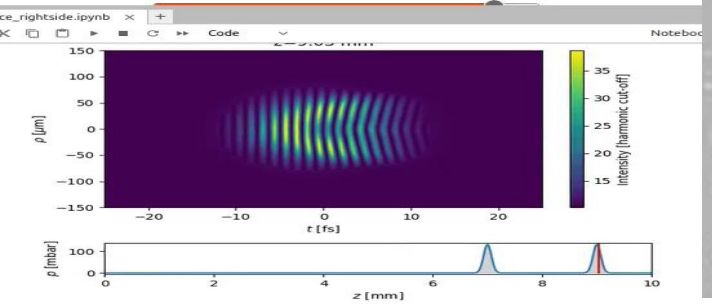
theoretical:

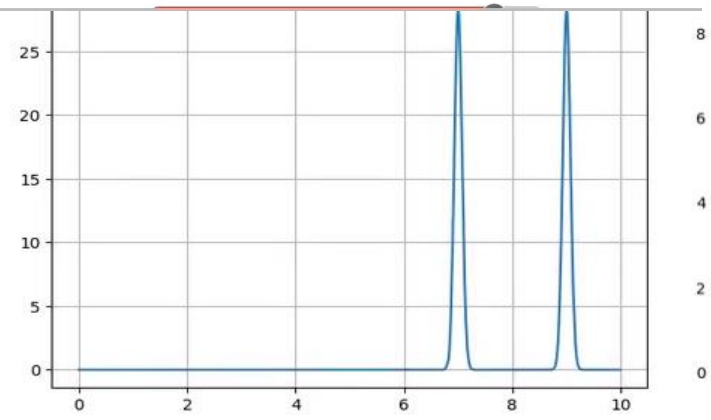


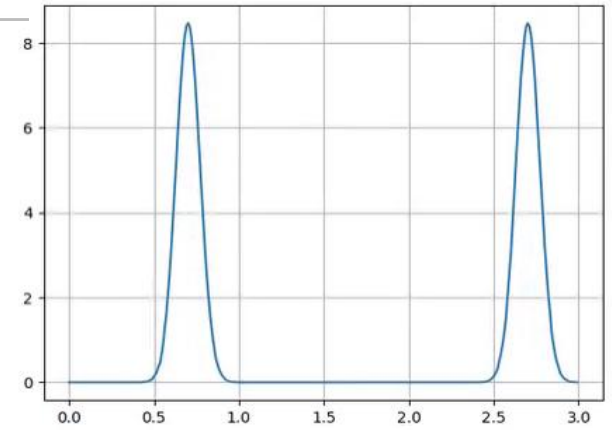


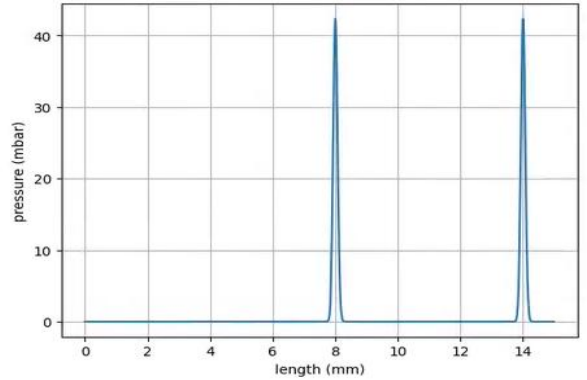
same gas configuration
different medium length
Dlfferent result
then which one should
i trust?

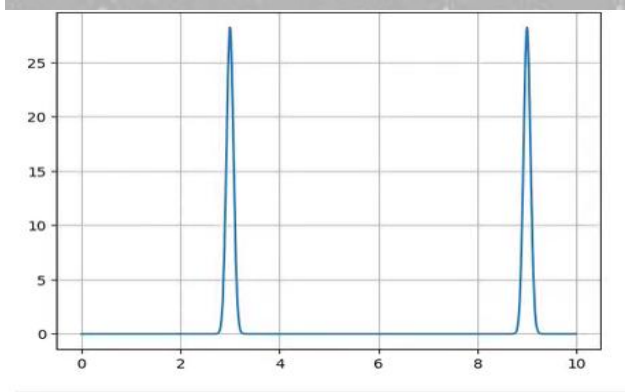


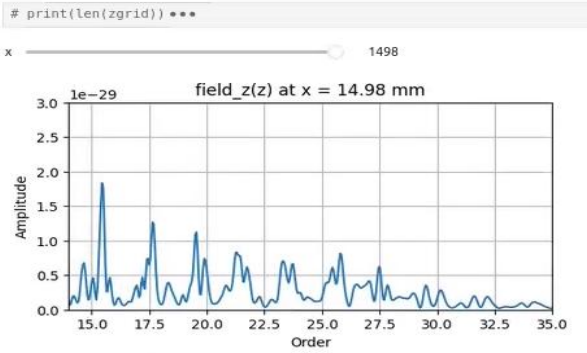


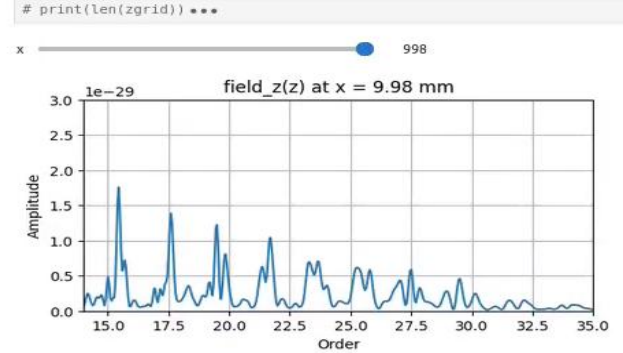


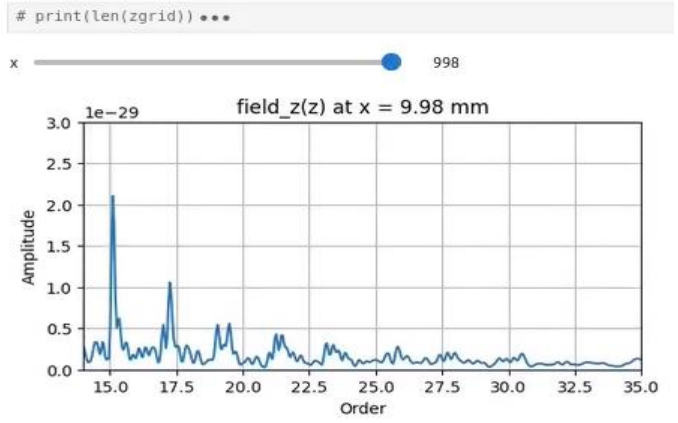


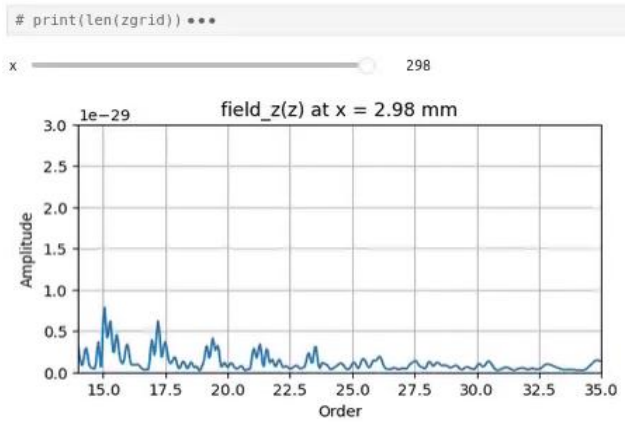


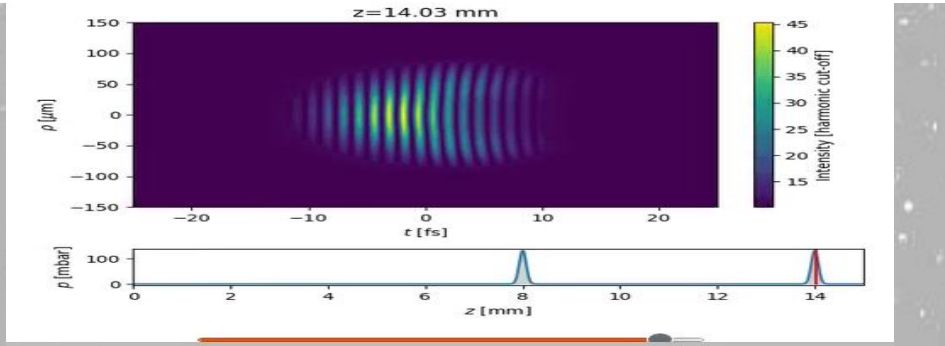


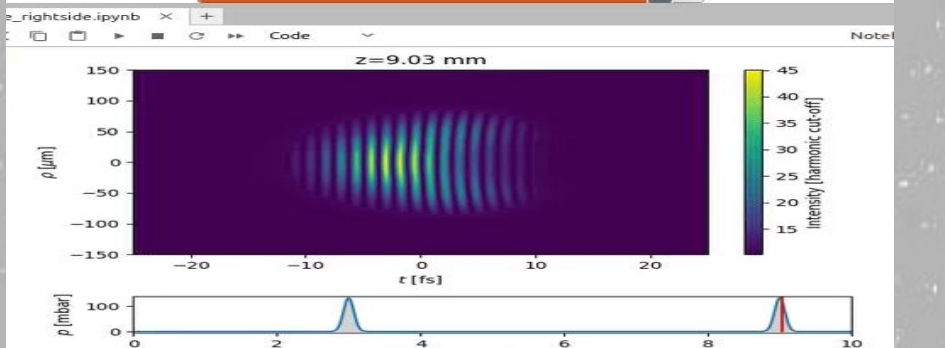


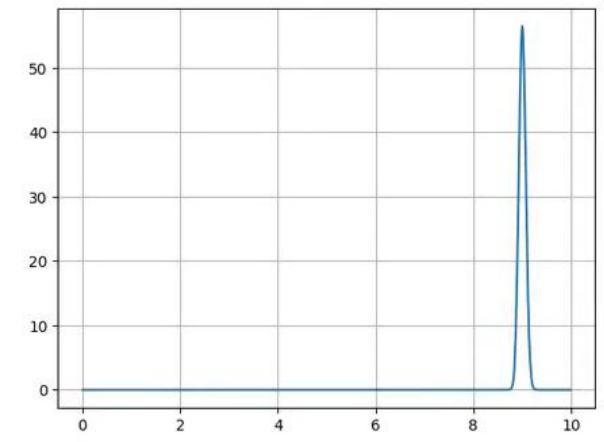


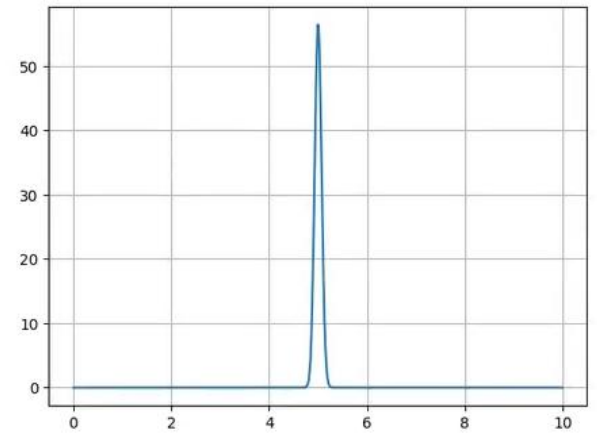


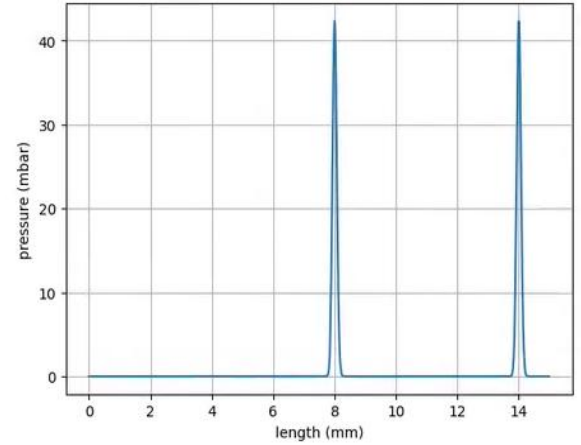


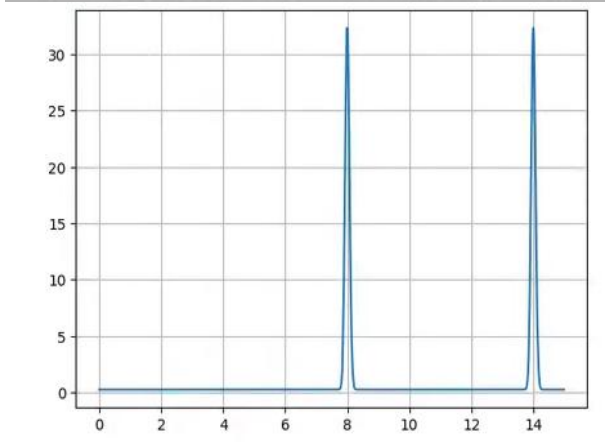


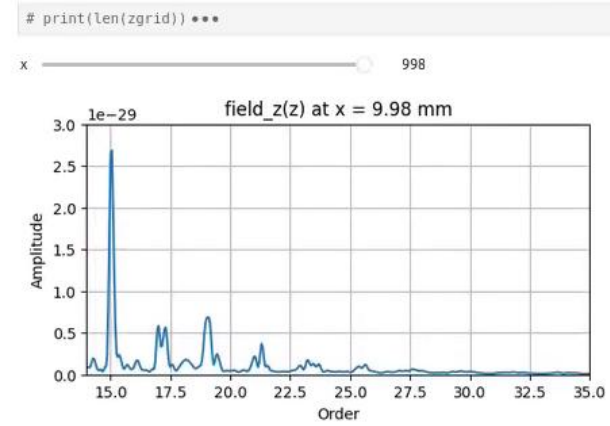


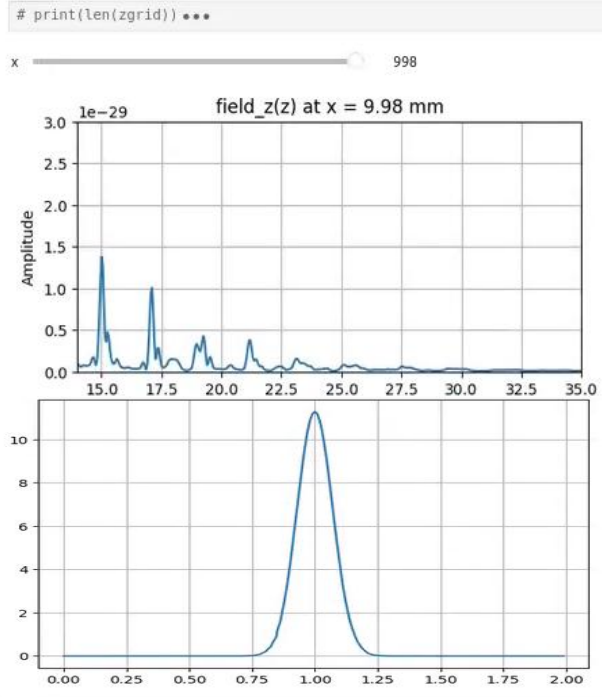


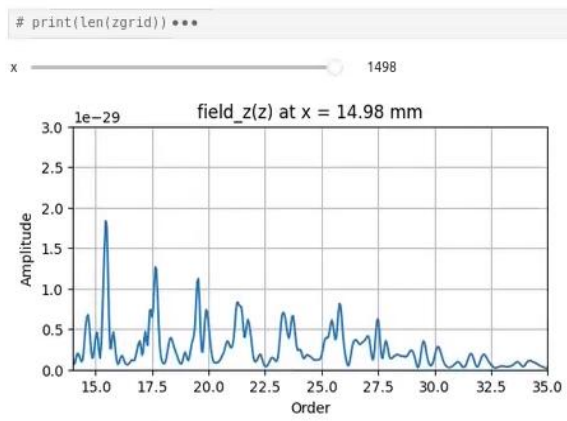


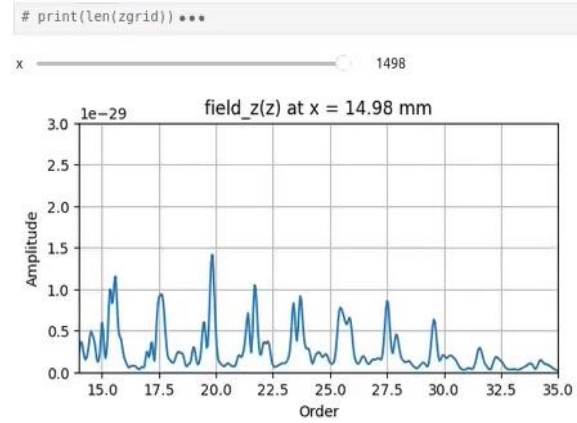












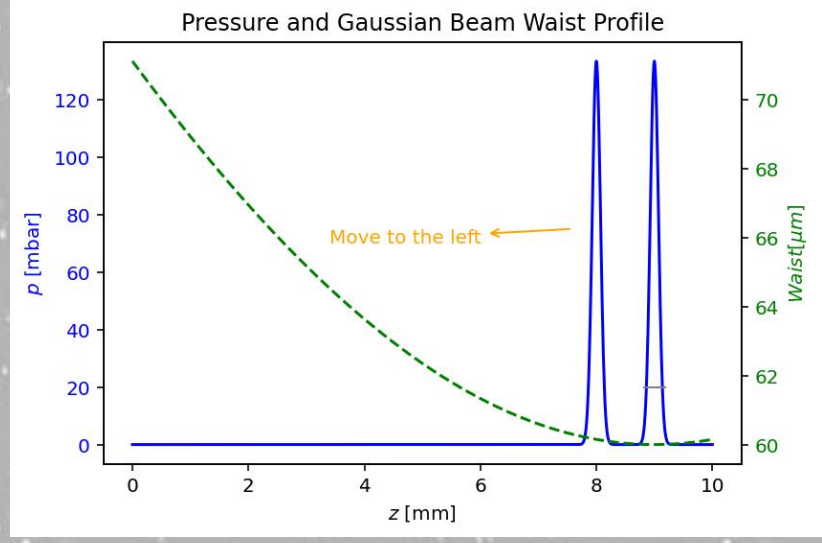
right focus

middle focus

15mm,sepa6
without residual

15mm,sepa6
with residual

Questions



- which part not handel well? why residual?
- TDSE: Nr_max=200, rstep=10 Reasonable?
- Cutoff~70+ , Hankel 30+ ? Normal?
- e.g 3mm , 10mm, same gas configuration, different Hankel? Make sense?
- Hrange[14,60] takes 30mins , I tried [1,45], more than 20h? is it divergent or ?
- does the Hankel T consider the absorbtion in the second gas jet?
- what do you think the serveral side peaks in one big peak are? error or real?

thanks bye.