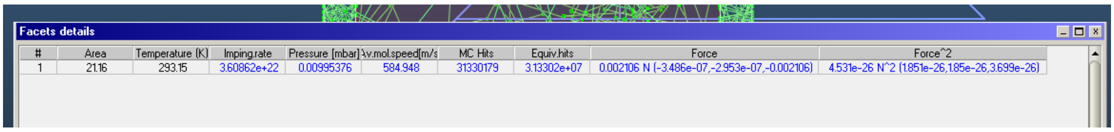
Since our experiment is similar to LISA, we also want to obtain the 'ForceSqr' variable. As you mentioned before, you defined it as the sums of m*v^2 components. It makes me confused. I give my calculation below.


Facets details

#	Area	Temperature (K)	Imping.rate	Pressure [mbar]	Av.mol.speed[m/s	MC Hits	Equiv.hits	Force	Force^2
1	21.16	293.15	3.60862e+22	0.00995376	584.948	31330179	3.13302e+07	0.002106 N (-3.486e-07,-2.953e-07,-0.002106)	4.531e-26 N^2 (1.851e-26,1.85e-26,3.699e-26)

Fig 1

As shown in fig 1, a screenshot at a certain time. Firstly, I make a simple check to the Force result. According to the document, the force should be calculated by eq. (1).

$$F_i = \frac{\sum dI}{dt} = \frac{\sum_{j=1}^{N_{hit,i}} I_{\perp,i,j} \cdot K_{\frac{real}{virtual}}}{t_{\mathrm{window}}} \approx \frac{N_{hit,i} \left\langle I_{\perp,i} \right\rangle \cdot K_{\frac{real}{virtual}}}{t_{\mathrm{window}}} \tag{1}$$

In this moment, the hits are 31330179, t_window = 1e-4 . Since the collision type is diffuse, so the average momentum is about m_0*sqrt(2*pi*k_b*T/m_0) in the normal direction.

In[2]:= $$\int_0^\infty \int_0^\infty \left(e^{-\frac{y^2}{v^2}} \frac{2\,y}{v^2}\, e^{-\frac{z^2}{v^2}} \frac{2\,z}{v^2} \, (y+z) \right) dy\, dz$$

Out[2]= $$\text{ConditionalExpression}\left[\frac{\sqrt{\pi}}{\sqrt{\frac{1}{v^2}}},\ \mathrm{Re}\left[v^2\right] > 0\right]$$

$$\left(v = \sqrt{\frac{2k_B T}{m}} \right)$$

The velocities in the normal direction obey the Rayleigh distribution. K_{real/test} can be calculated by the imping rate.

$$K_{\frac{real}{virtual}} = \frac{z t_{\mathrm{window}} A}{N_{hit,i}}$$

The I obtain 0.00210153 N, closed to the simulated result.

In[5]:= $k_B = 1.3806503 \times 10^{-23}$; $T = 293.15$; $m = 18 \times 1.670539066 \times 10^{-27}$; $A = 21.16 \times 10^{-4}$;

$$F = \frac{31\,330\,179}{10^{-4}}\, m \sqrt{\frac{2\,\pi\, k_B\, T}{m}}\ \frac{3.60862 \times 10^{22} \times 10^{-4}}{31\,330\,179}\, A$$

Out[6]= 0.00211153

For the calculation of ForceSqr, I list two possible equation that you may used.

$$F_i^2 = \frac{\sum dI^2}{dt^2} = \frac{\sum_{j=1}^{N_{hit,i}} I_{\perp,i,j}^2 \cdot K_{\frac{real}{virtual}}}{t_{\mathrm{window}}^2} \approx \frac{N_{hit,i} \left\langle I_{\perp,i}^2 \right\rangle \cdot K_{\frac{real}{virtual}}}{t_{\mathrm{window}}^2} \tag{3}$$

$$F_i^2 = \frac{\sum dI^2}{dt^2} = \frac{\sum_{j=1}^{N_{hit,i}} I_{\perp,i,j}^2 \cdot K_{\frac{real}{virtual}}}{t_{\mathrm{window}}} \approx \frac{N_{hit,i} \left\langle I_{\perp,i}^2 \right\rangle \cdot K_{\frac{real}{virtual}}}{t_{\mathrm{window}}} \tag{4}$$

Similar to the above calculation, the $\left\langle I_{\perp,i}^2 \right\rangle$ is about m_0^2*{(4+pi)*k_b*T/m_0}.

$$\int_0^\infty \int_0^\infty \left(e^{-\frac{y^2}{v^2}} \frac{2\,y}{v^2}\, e^{-\frac{z^2}{v^2}} \frac{2\,z}{v^2} \,(y+z)^2 \right) dy\, dz$$

$$\text{ConditionalExpression}\left[\frac{1}{2}\,(4+\pi)\,v^2,\ \text{Re}\left[v^2\right] > 0\right]$$

Inserting these parameters into eqs. (3) and (4), the result is

$$\text{In[12]:=}\quad \mathbf{FSqr1} = \frac{31\,330\,179}{10^{-8}}\, m^2\,(4+\pi)\,\frac{k_B\,T}{m}\,\frac{3.60862\times 10^{22}\times 10^{-4}}{31\,330\,179}\, A$$

$$\mathbf{FSqr2} = \frac{31\,330\,179}{10^{-4}}\, m^2\,(4+\pi)\,\frac{k_B\,T}{m}\,\frac{3.60862\times 10^{22}\times 10^{-4}}{31\,330\,179}\, A$$

$$\text{Out[12]=}\quad 6.63674\times 10^{-22}$$

$$\text{Out[13]=}\quad 6.63674\times 10^{-26}$$

Therefore, Eq. (4) may be the possible method in your code. But I'm not sure the discrepancy between 6.63674e-26 and 3.699e-26.

In fact, Eq. (3) should be more suitable. For example, from a quantitative point of view

$$F_i = \frac{N_{hit,i}\left\langle I_{\perp,i}\right\rangle \cdot K_{\frac{real}{virtual}}}{t_{\text{window}}} \Leftrightarrow \frac{1\cdot \text{kg}\cdot \text{m}/s\cdot 1}{\text{s}} = \text{kg}\cdot\frac{\text{m}}{\text{s}^2} = \text{Newton}$$

But

$$F_i^2 = \frac{N_{hit,i}\left\langle I_{\perp,i}^2\right\rangle \cdot K_{\frac{real}{virtual}}}{t_{\text{window}}^2} \Leftrightarrow \frac{1\cdot\left(\text{kg}\cdot\text{m}/s\right)^2\cdot 1}{\text{s}^2} = \left(\text{kg}\cdot\frac{\text{m}}{\text{s}^2}\right)^2 = \text{Newton}^2$$

$$F_i^2 = \frac{N_{hit,i}\left\langle I_{\perp,i}^2\right\rangle \cdot K_{\frac{real}{virtual}}}{t_{\text{window}}} \Leftrightarrow \frac{1\cdot\left(\text{kg}\cdot\text{m}/s\right)^2\cdot 1}{\text{s}} = \left(\text{kg}\cdot\frac{\text{m}}{\text{s}^2}\right)^2 \text{s} = \text{Newton}^2\cdot\text{s}$$