

a) Note that for two points i and j, the macguffin is of the form

$$G_{ij} = m_i m_j (x_i - x_j)^2$$

Now, to not overcount the particles, we will choose i and then choose j to be greater than i. Then, we get that the total macguffin would be:

$$G = \sum_{i=1}^N \sum_{j>i} G_{ij} = \sum_{i=1}^N \sum_{j=i+1}^N m_i m_j (x_i - x_j)^2$$

b) Now for the continuous case, let us take two segments at distance u and v and taking v to be more than u, and let the length of the segments be du and dv. Then the macguffin because of these two segment would be:

$$dG = \mu(u) du \mu(v) dv (v - u)^2 = \mu(u) \mu(v) (v - u)^2 du dv$$

From this, we get that the total macguffin would be:

$$G = \int dG = \int_a^b \int_u^b \mu(u) \mu(v) (v - u)^2 dv du$$

We were unable to transcribe this image

We were unable to transcribe this image

We were unable to transcribe this image

We were unable to transcribe this image