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Annular-Radial Dose Distributions.

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Annular dose, AD is a concept deduced from radial dose simulated codes that enables one to draw a map of dose distribution around the ion's path at the nanometer scale. The distribution of dose for different equal LET elements' groups of the same LET (in keV.µm-1) were studied using this concept.

- **Annular-dose (AD)** is a new conception introduced, based on the radial dose distribution, RDD, AD is the integrated dose for many shells around the ions and it is defined as the dose deposited in the shell volume perpendicular to the ion **path of width(r=0.1→R_min)**, length equal 2π and thickness equal unity (1nm). Thus, it integrates and maps the deposited dose due to ion in any medium at nanometer scale better than the ordinary radial dose. The annular dose, AD as a function of the shell width for the ions under investigation showed that dose distributions around the ions of same LET are not the same and a clear peak at certain shell width called the ion's maximum annular dose width.
- **rMADW** was determined for the first time. The rMADW is the position where the maximum reachable dose is delivered by secondary electrons around the ion. The ion's rMADW showed an increasing function with Z*β within the same LET group. Interestingly, it was found that rMADW behaves as an increasing monotonic function of the relative ion velocity, β.

The new concept of radial and annular dose distributions will be present for dose distribution around the latent track of an ion penetrating matter. These results were obtained from a large number of ion types which are summarized in groups of defined LET. Basing on two fundamental works by Katz (radial dose distribution)and Tabata (electron range), a simulation model was developed.

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