The Annual NASA Space Radiation Summer School
2010 Slide Competition
For The Health Risks of Extraterrestrial Environments (THREE)

Third Place

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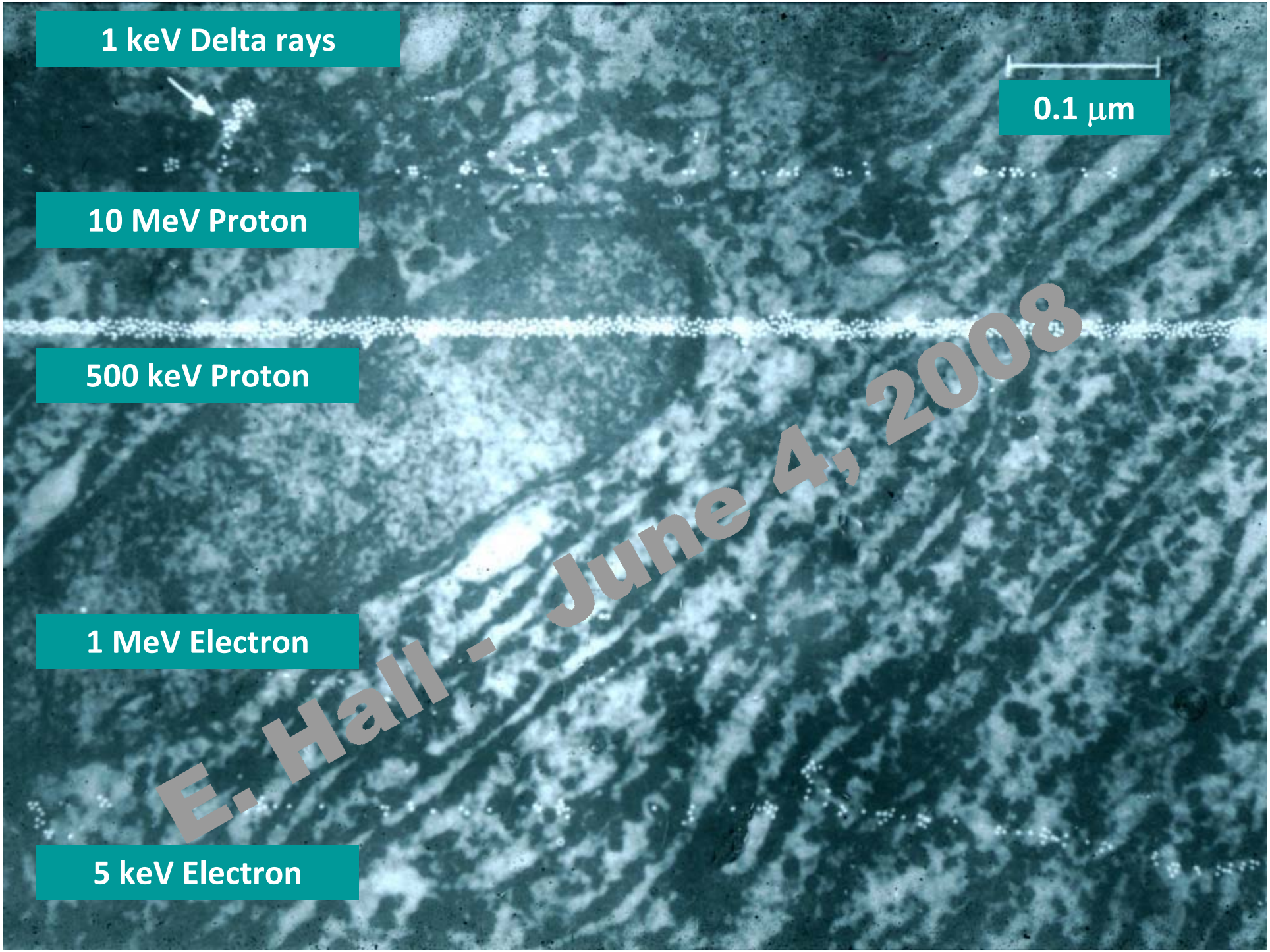
Submission on
Track Structure
from
Eric Hall (2008)
Cellular Radiobiology: Biological Responses to High LET Radiation

NASA Space Radiation Summer School


1 keV Delta rays
0.1 μm
10 MeV Proton
500 keV Proton
1 MeV Electron
5 keV Electron
E. Hall - June 4, 2008

When radiation is absorbed in a biological material, ionization and excitations tend to be localized along the tracks of individual charged particles in a pattern that depends on the type of radiation.

Therefore, the spatial distribution of the ionizing events produced by different particles varies enormously, as shown in the previous slide that illustrates the variation of *ionization density* associated with different types of radiation. (The background is an electron micrograph of a human cell and the white dots represent a computer simulation of ionizing events.)

Depending on the *density of ionizations* generated along the track, radiation is said sparsely ionizing such as 1 MeV electrons, intermediately ionizing such as 10 MeV protons or densely ionizing such as 500 keV protons.

The concept of *ionization density* along the track of a charged particle is translated in mathematical terms as an average quantity:

the Linear Energy Transfer or LET of a radiation.