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RADSAGA Training Workshop – March 2018

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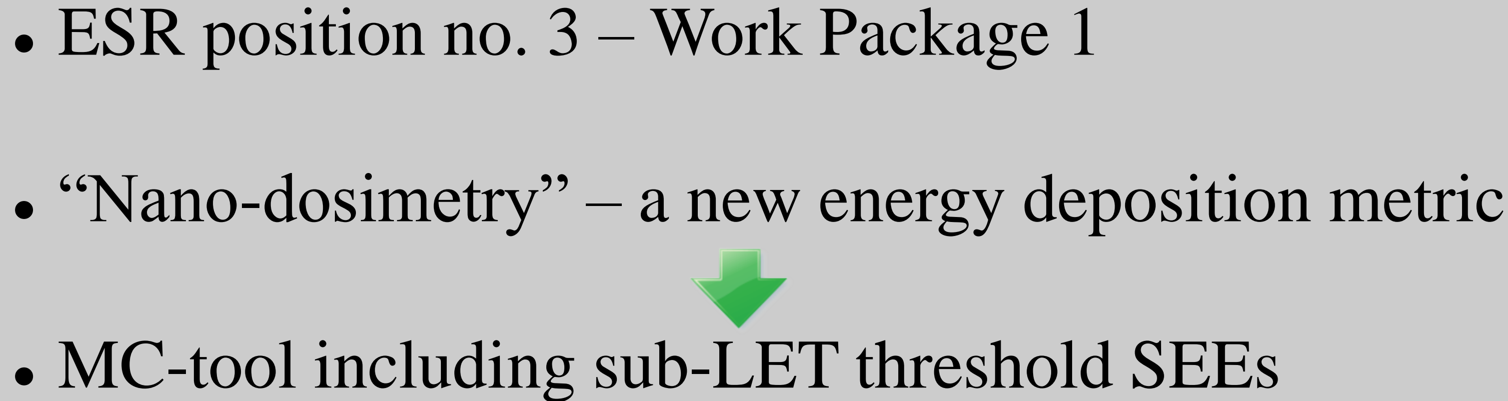
https://www.rug.nl/kvi-cart/

Key points



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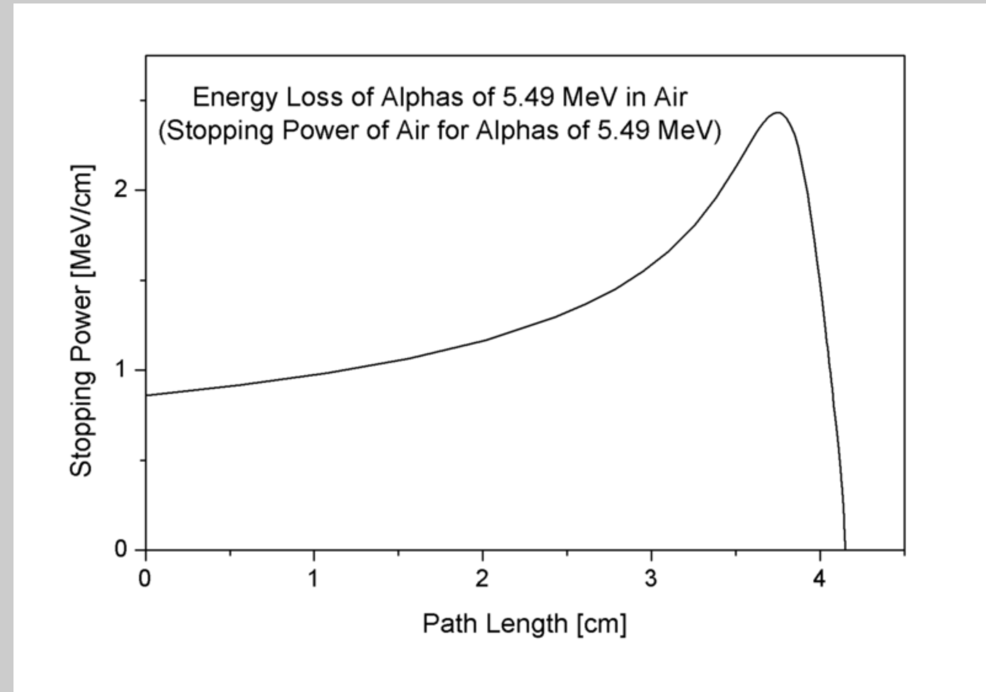
LET describes only an average of deposited energy

- *Excitation and ionization of target/projectile atoms*
- *Electron capture*
- *Electromagnetic radiation*
- ***Nuclear reactions***
- ***Recoil loss ('nuclear stopping')***



https://en.wikipedia.org/wiki/File:Bragg_Curve_for_Alphas_in_Air.png

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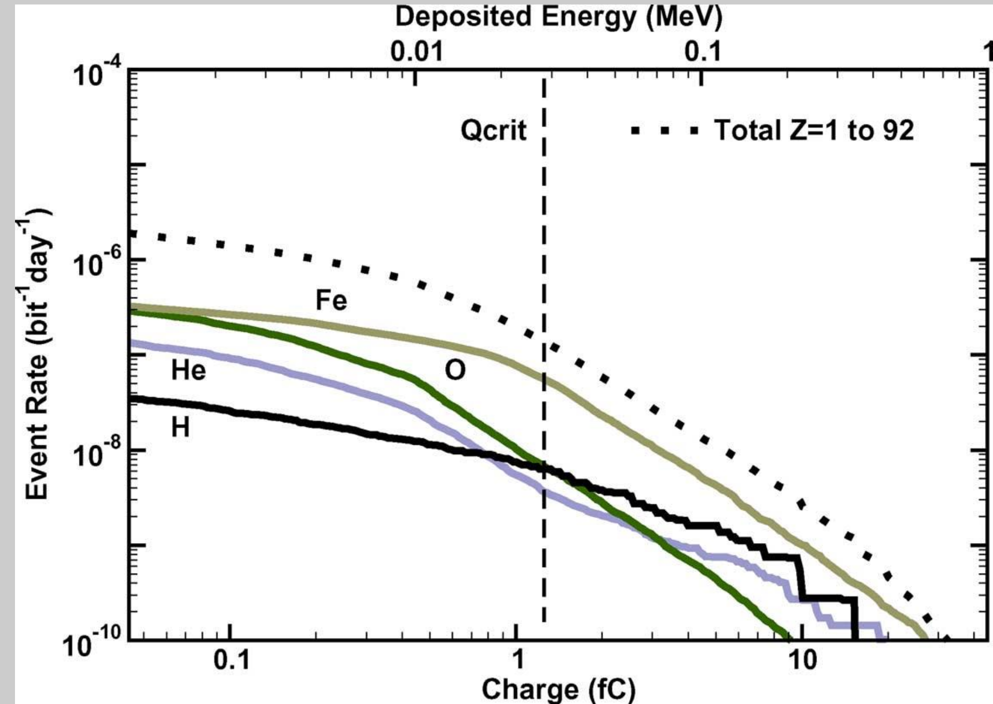
A new energy deposition metric

- As technology keeps decreasing scaling, local variation of deposited charge may cause SEE on larger scale
- A new tool concerning nano-dose distribution and at the same time giving reasonable computing time is needed



Brian D. Sierawski et al., *IEEE,* Dec. 2009

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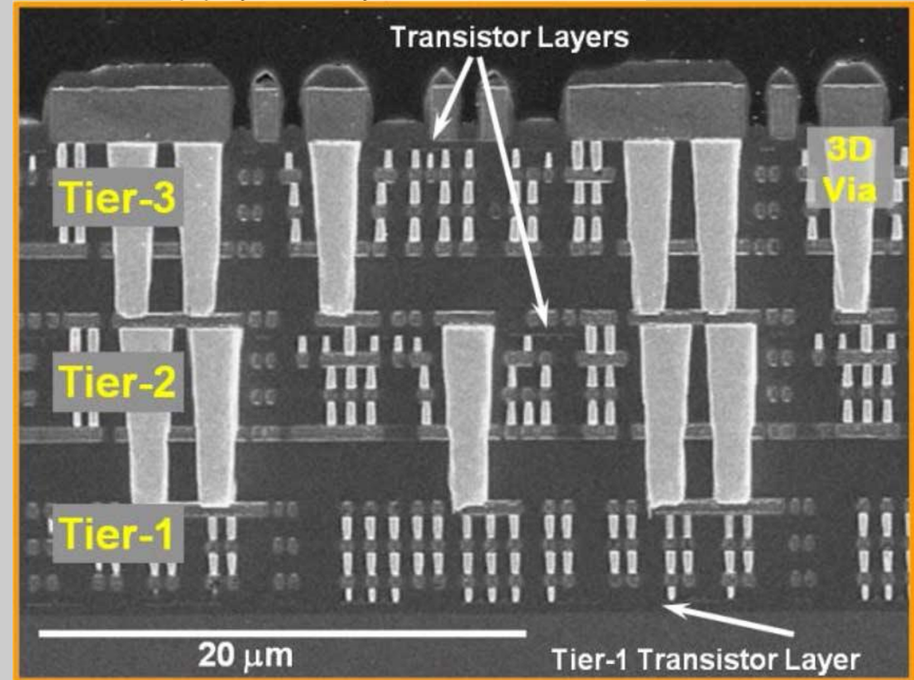
What do we need to take into account?

- Geometry – layout of IC,new tech. e.g. 3 DIC
- Materials – diverse componentse.g. SiC, GaN
- Interfaces – possible drawbacks as technology keeps scaling



David F. Heide et al., *IEEE T,* Dec. 2006; Véronique Ferlet-Cavrois et al., *IEEE,*Jun. 2013

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Summary

- We are looking for an energy deposition metric which takes into account phenomenas occurring in nanoscale

- MC-simulation-tool with reasonable time-frame needed

Upcoming campaigns

- Summer 2018 – KVI-CART
- Autumn 2018? – Uppsala University
- Autumn 2020? – CHARM at CERN

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[1] https://www.rug.nl/kvi-cart/

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[3] Brian D. Sierawski et al., "Impact of Low-Energy Proton Induced Upsets on Test Methods and Rate Predictions", *IEEE Trans. Nucl. Sci.*, vol. 56, NO. 6 pp. 3085-3092, Dec. 2009

[4] David F. Heide et al., "Single-Event-Upset Critical Charge Measurements and Modeling of 65 nm Silicon-on-Insulator Latches and Memory Cells", *IEEE Trans. Nucl. Sci.*, vol. 53, NO. 6 pp. 3512-3517, Dec. 2006

[5] Véronique Ferlet-Cavrois et al., "Single Event Transients in Digital CMOS—A Review", *IEEE Trans. Nucl. Sci.*, vol. 60, NO. 3 pp. 1767-1790, Jun. 2013

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