Dissertation Outline

1. Introduction
2. Background
   1. SRAM topology and operation
      1. Describe cross coupled inverter configuration
      2. Write operation
      3. Read operation
      4. Standby operation
      5. Lower operating supply voltage – advantages – common practice
   2. SEUs in SRAM
      1. Very basic description here incident particle deposits energy
      2. Charge is generated and collected
      3. Transient on output of device
      4. If transient is of sufficient time and duration an upset may occur
      5. Introduce concept of critical charge for SEU
      6. Trends in critical charge
   3. TID Imprinting of SRAM
      1. Rely heavily on Fleetwood’s work from 1986 and 1987
      2. What is pattern imprinting
      3. How does it happen
      4. How much dose does this correspond to
      5. What are some indications pattern imprinting has occurred
   4. Rail-span collapse of SRAM
      1. What is rail-span collapse
      2. How does it happen
      3. What dose rates did this correspond to in previous technology generations
      4. What are patterns in errors that indicate rail-span collapse is contributing to the error rate
      5. Rely heavily on massengill’s work from whenever it was he was in school
   5. Low-energy proton effects
      1. Use basic descriptions from Rodbell and Heidel
      2. Use figures from same to explain the mechanism
      3. Mention lowered applied bias to observe effect at 65 nm node
   6. Muon-induced upsets
      1. Leverage brians work exclusively
      2. Figures and conclusions / descriptions
   7. Physics of photon-matter interactions
      1. Show image of energy dependence on dominant physical mechanism generating secondary electrons
      2. Discuss Compton scattering effect
      3. Discuss photoelectric effect
   8. Review of recent studies of electron effects in SRAM
      1. Is this the right place to include your previous work?
      2. It would seem the background is the most relevant place to put the evaluation of delta-rays with simulators
      3. Keep in mind murat and raine results that electrons do not significantly impact current generation technology nodes (at least not measurably).
3. Experimental Results
4. Simulation Results
5. Conclusions
6. Appendix A – Experimental Methods
7. Appendix B – Evaluating flux of photons