

COMPUTATIONAL EVALUATIONS OF PROTON INDUCED GAIN IN A PORTABLE FARADAY CUP

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INTRODUCTION

Bragg peak behavior of proton dosimetry, popular therapeutic technique, pencil beam scanning

EXPERIMENTAL DESIGN

Monte Carlo Simulation

Geant4 10.1-patch01

- Run beam energy for N Events
- For each particle $Track\ i$ per Event j , tally net signal gain

$$g_{ij} = \begin{cases} q_i e^{-1}, & \text{if } q_i \rightarrow Cu \\ q_i d\% e^{-1}, & \text{if } q_i \rightarrow KA(d\%) \\ -q_i e^{-1}, & \text{if } Cu \rightarrow q_i \\ -q_i d\% e^{-1}, & \text{if } KA(d\%) \rightarrow q_i \end{cases}$$

- Charge defect = $1 - N^{-1} \sum_j \sum_i g_{ij}$

Geometry Construction

Table 1: Geant4 simulation cylindrical construction; all model combinations iterated in both air and vacuum

Volume	Radius (mm)	Height (mm)
Copper	30	100
	Model	Thickness (μm)
Kapton1	S59	59
	S100	100
	S200	200
Silver	+Ag/KA	12
Kapton2	+Ag/KA	62

Parameters

- FTFP-BERT2.0 Physics List
- $N = 1\text{e}9$ protons
- Energy range: 70 - 250 MeV
- Step cutoff: $5\ \mu\text{m}$ ($\sim 150\ \text{keV}$ in Cu)

CONTACT INFORMATION

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SIMULATION RESULTS

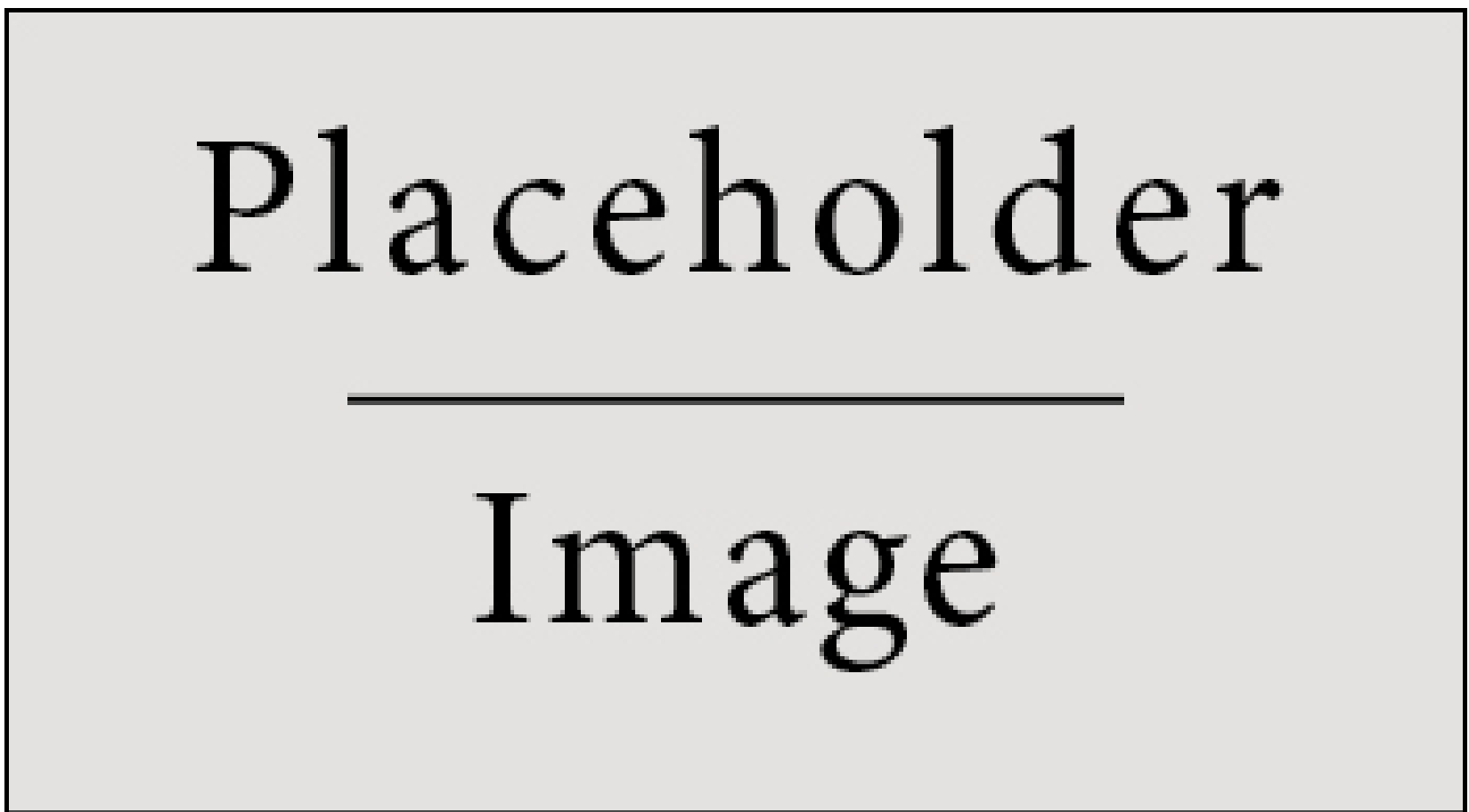


Figure 1: Figure caption

Donec et dui non massa tristique adipiscing.

Quisque vestibulum eros eu.

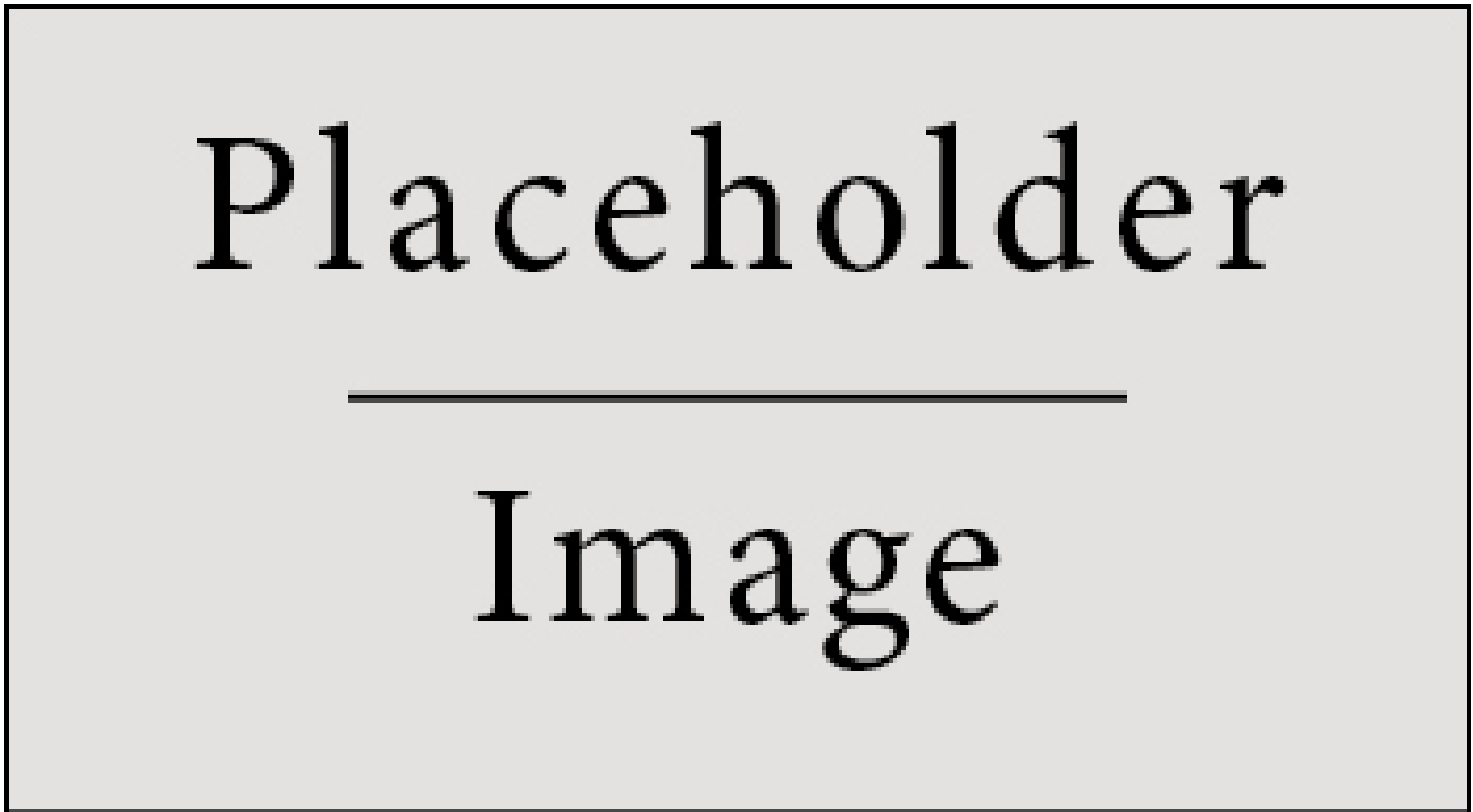


Figure 2: Figure caption

EXPERIMENTAL RESULTS

- Nunc at convallis urna. isus ante. Pellentesque condimentum dui. Etiam sagittis purus non tellus tempor volutpat. Donec et dui non massa tristique adipiscing.

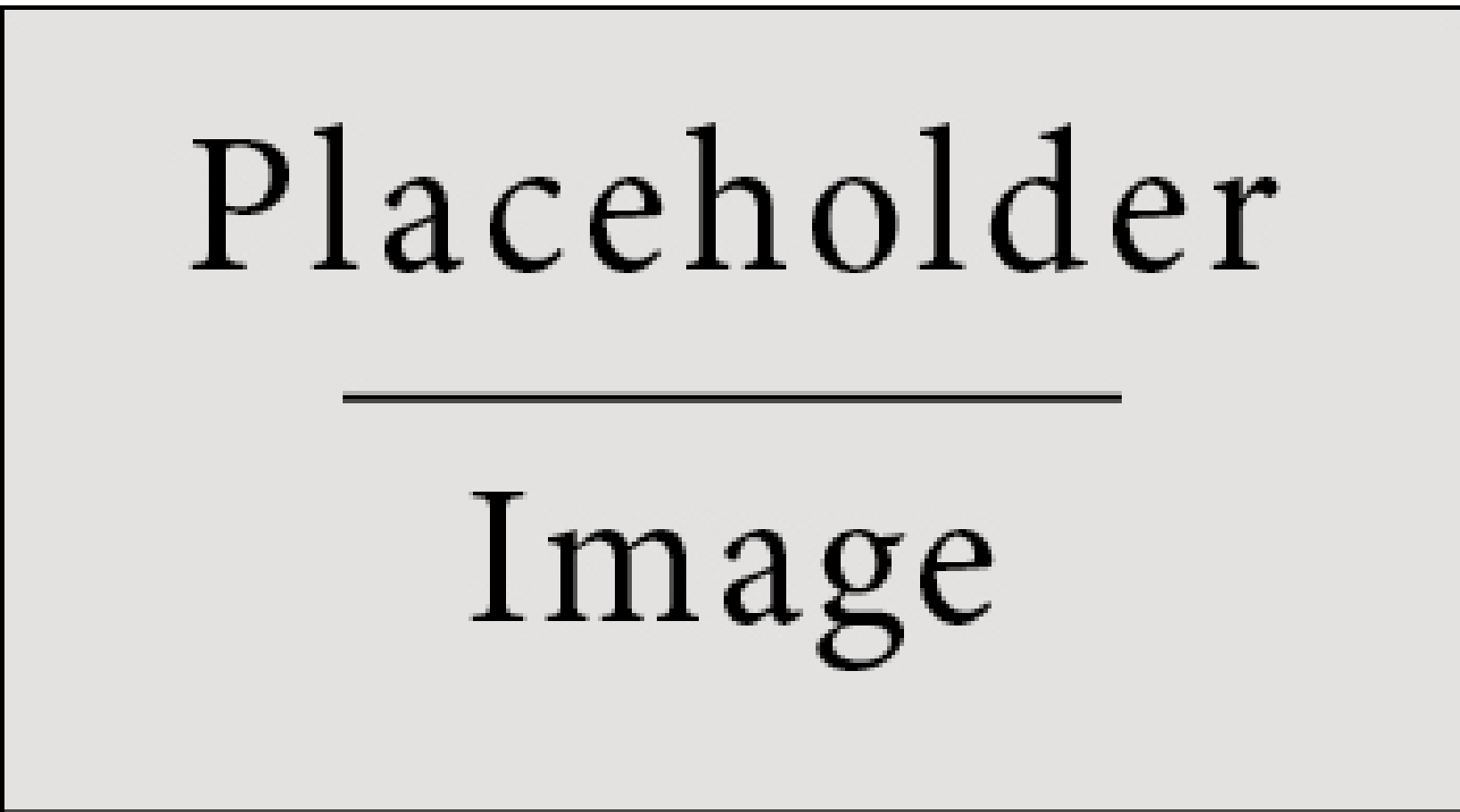


Figure 3: Figure caption

REFERENCES

[1] B. Gottschalk. "A Poor Man's Faraday Cup". Abstracts XIX PTCOG Meeting, Cambridge, MA, 13 (1993).

[2] E. Cascio and B. Gottschalk. "A Simplified Vacuumless Faraday Cup for the Experimental Beamline at the Francis H. Burr Proton Therapy Center". *IEEE Radiation Effects Data Workshop*, p.155–161, (2009).

CONCLUSIONS

Donec tincidunt, nunc in feugiat varius, lectus lectus auctor lorem, egestas molestie risus erat ut nibh. Quisque id dui sed ante sollicitudin sagittis.