OpenTOPAS-nBio (TOPAS v3.9)

Regression testing (cf. OpenTOPAS-nBio (TOPAS v3.9))

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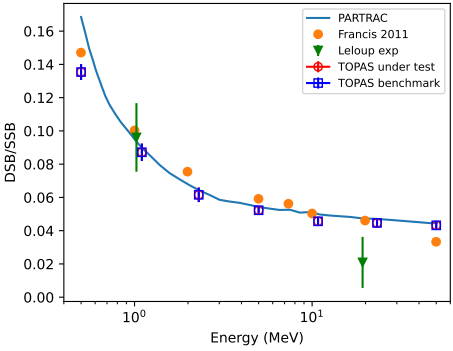
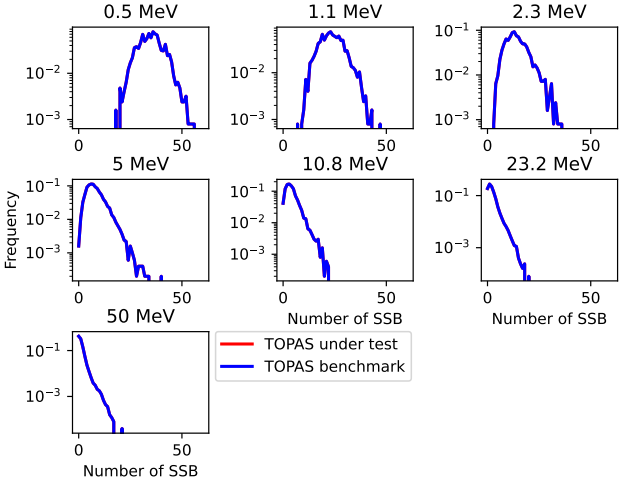
DBSCAN - TsEmDNAPhysics

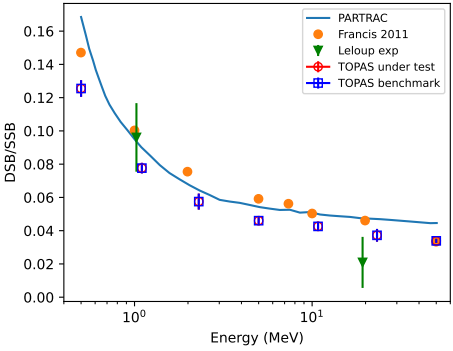


	TOPAS under test (s)	TOPAS benchmark (s)
Init.	0.0 +/- 0.0	0.0 +/- 0.0
Exec.	152.0 +/- 0.5	152.0 +/- 0.5
Final.	0.0 +/- 0.0	0.0 +/- 0.0

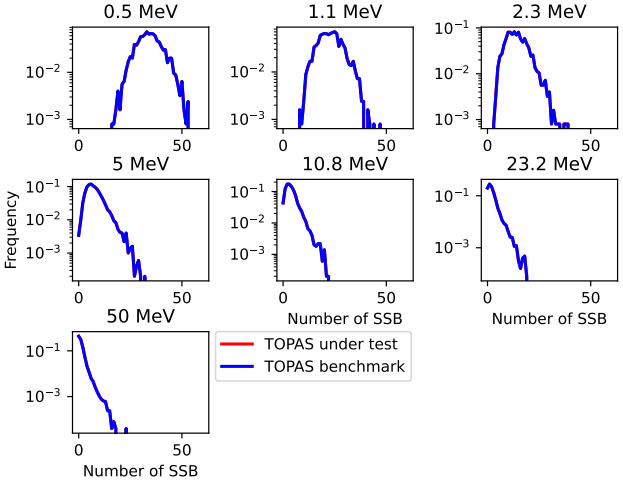


Francis Z, Villagrasa C, Clairand I. Simulation of DNA damage clustering after proton irradiation using an adapted DBSCAN algorithm. *Comput Methods Programs Biomed.* 2011; 101(3):265-270. doi:10.1016/j.cmpb.2010.12.012

DBSCAN - g4em-dna_opt2

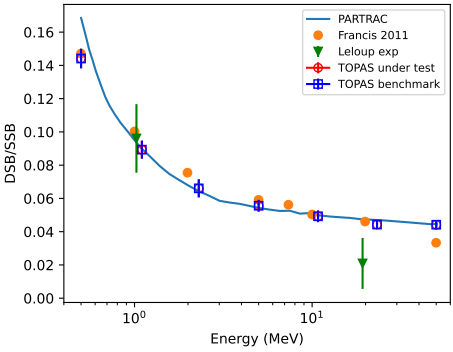


	TOPAS under test (s)	TOPAS benchmark (s)
Init.	0.0 +/- 0.0	0.0 +/- 0.0
Exec.	146.1 +/- 1.2	146.1 +/- 1.2
Final.	0.0 +/- 0.0	0.0 +/- 0.0

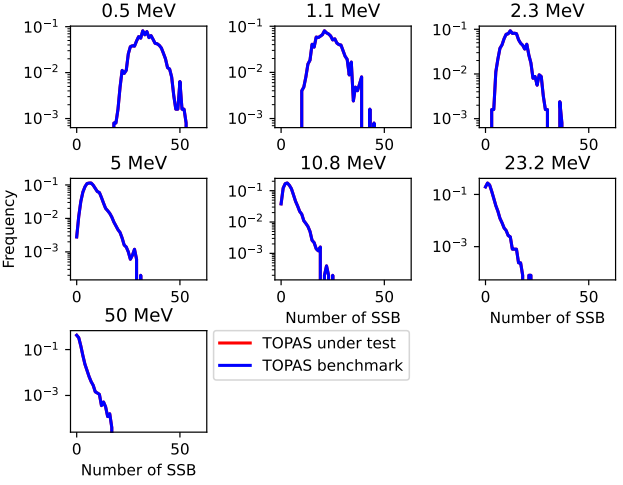


Francis Z, Villagrasa C, Clairand I. Simulation of DNA damage clustering after proton irradiation using an adapted DBSCAN algorithm. *Comput Methods Programs Biomed.* 2011; 101(3):265-270. doi:10.1016/j.cmpb.2010.12.012

DBSCAN - g4em-dna_opt4

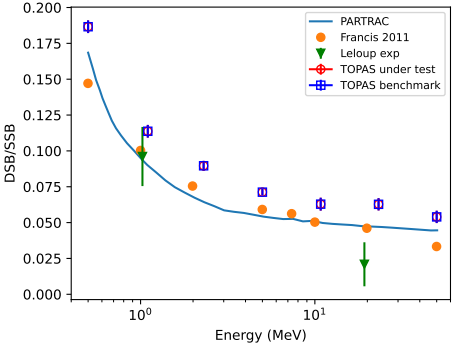


	TOPAS under test (s)	TOPAS benchmark (s)
Init.	0.0 +/- 0.0	0.0 +/- 0.0
Exec.	451.3 +/- 0.6	451.3 +/- 0.6
Final.	0.0 +/- 0.0	0.0 +/- 0.0

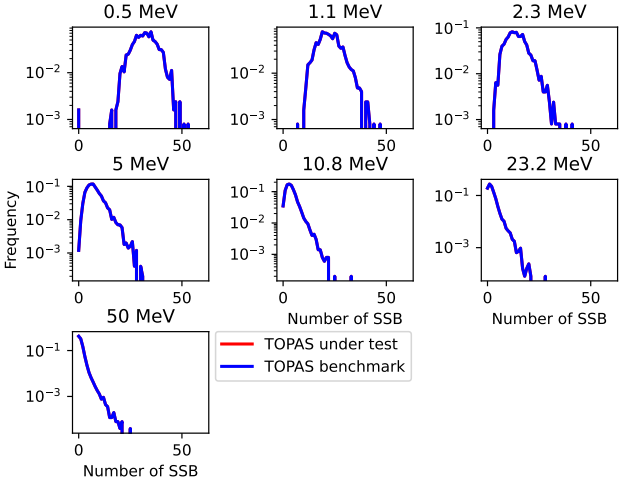


Francis Z, Villagrasa C, Clairand I. Simulation of DNA damage clustering after proton irradiation using an adapted DBSCAN algorithm. *Comput Methods Programs Biomed.* 2011; 101(3):265-270. doi:10.1016/j.cmpb.2010.12.012

DBSCAN - g4em-dna_opt6

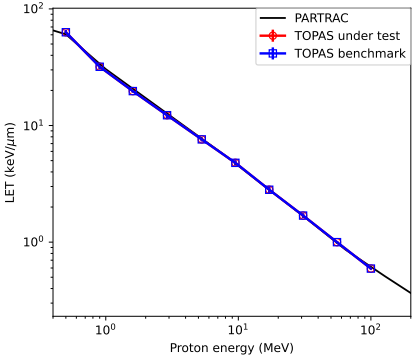


	TOPAS under test (s)	TOPAS benchmark (s)
Init.	0.0 +/- 0.0	0.0 +/- 0.0
Exec.	129.1 +/- 0.7	129.1 +/- 0.7
Final.	0.0 +/- 0.0	0.0 +/- 0.0

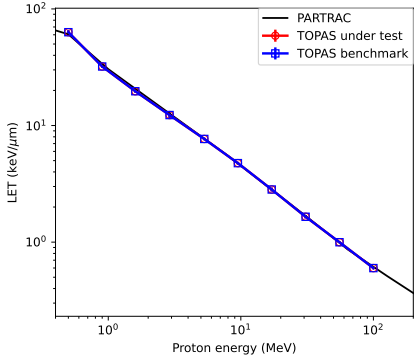


Francis Z, Villagrasa C, Clairand I. Simulation of DNA damage clustering after proton irradiation using an adapted DBSCAN algorithm. *Comput Methods Programs Biomed.* 2011; 101(3):265-270. doi:10.1016/j.cmpb.2010.12.012

LET I



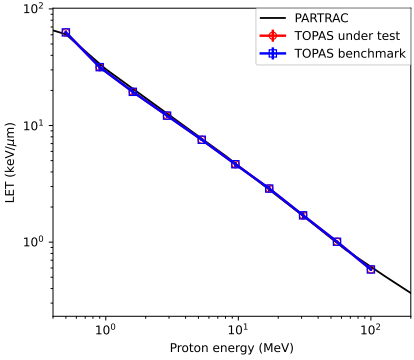
	TOPAS under test (s)	TOPAS benchmark (s)
Init.	0.0 +/- 0.0	0.0 +/- 0.0
Exec.	262.7 +/- 0.5	262.7 +/- 0.5
Final.	0.0 +/- 0.0	0.0 +/- 0.0



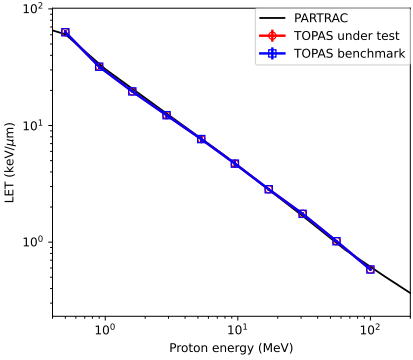
	TOPAS under test (s)	TOPAS benchmark (s)
Init.	0.0 +/- 0.0	0.0 +/- 0.0
Exec.	253.1 +/- 1.0	253.1 +/- 1.0
Final.	0.0 +/- 0.0	0.0 +/- 0.0

- LET as a function of proton energy for TsEmDNAPhysics (left) and g4em-dna_opt2 (right).

LET II



	TOPAS under test (s)	TOPAS benchmark (s)
Init.	0.0 +/- 0.0	0.0 +/- 0.0
Exec.	719.6 +/- 1.8	719.6 +/- 1.8
Final.	0.0 +/- 0.0	0.0 +/- 0.0

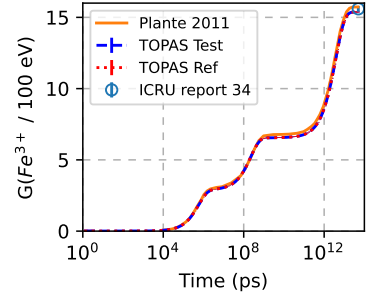


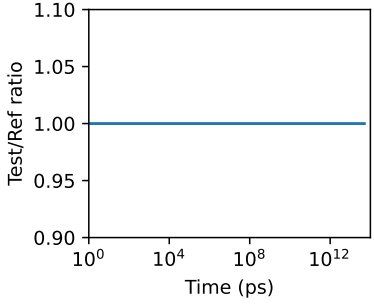
	TOPAS under test (s)	TOPAS benchmark (s)
Init.	0.0 +/- 0.0	0.0 +/- 0.0
Exec.	236.4 +/- 1.0	236.4 +/- 1.0
Final.	0.0 +/- 0.0	0.0 +/- 0.0

- LET as a function of proton energy for g4em-dna_opt4 (left) and g4em-dna_opt6 (right).

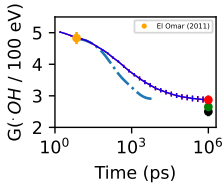
Fricke: IRT

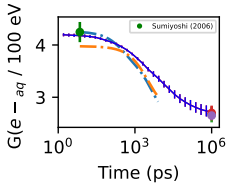
	TOPAS under test	TOPAS benchmark
Init. (s)	0.012 +/- 0.004	0.012 +/- 0.004
Exec. (s)	6.898 +/- 0.685	6.898 +/- 0.685
Final. (s)	0.006 +/- 0.005	0.006 +/- 0.005
Value (/100eV)	15.378 +/- 0.035	15.378 +/- 0.035

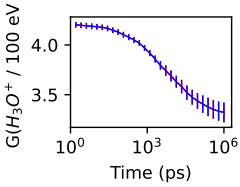


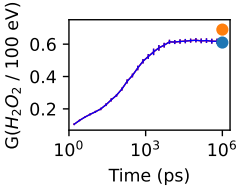


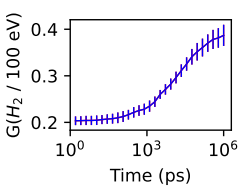
G-value: step-by-step

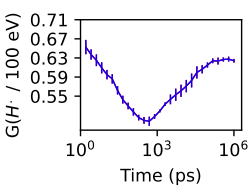


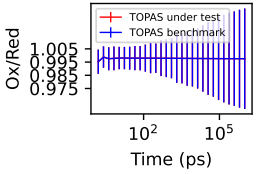






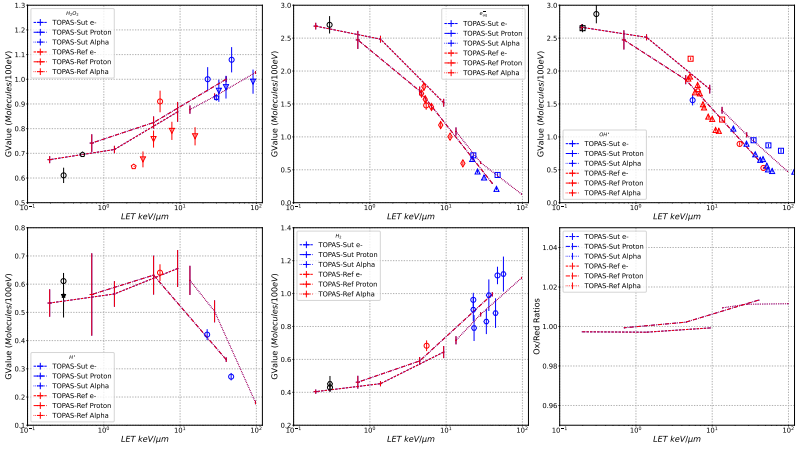






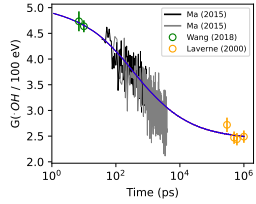
	TOPAS under test (s)	TOPAS benchmark (s)
Init.	0.0 +/- 0.0	0.0 +/- 0.0
Exec.	156.0 +/- 54.1	156.0 +/- 54.1
Final.	0.0 +/- 0.0	0.0 +/- 0.0

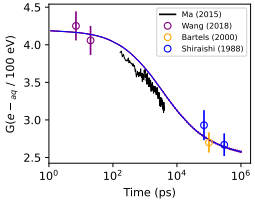
G-value vs. LET: step-by-step

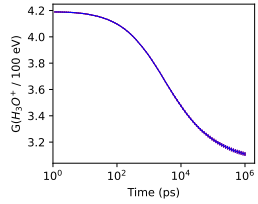


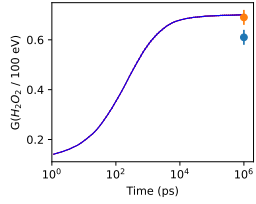
	TOPAS-Ref	TOPAS-Sut
Real	36863.080 +/- 518.497	36863.080 +/- 518.497
User	36844.920 +/- 518.185	36844.920 +/- 518.185
Sys	18.064 +/- 0.323	18.064 +/- 0.323

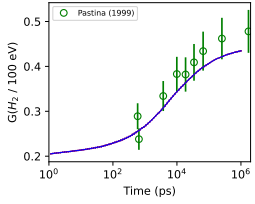
G-value: IRT

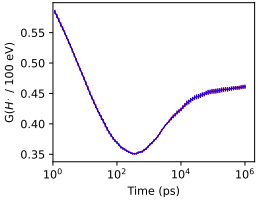


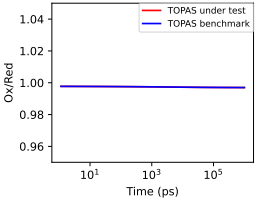






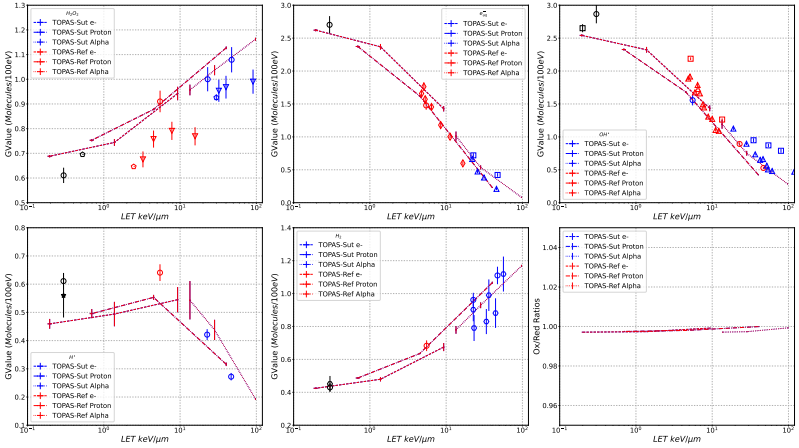






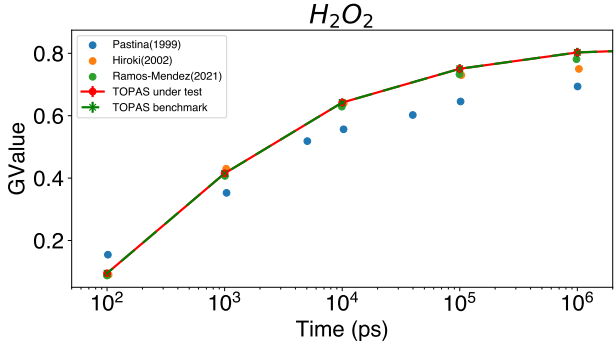
	TOPAS under test (s)	TOPAS benchmark (s)
Init.	0.010 +/- 0.000	0.010 +/- 0.000
Exec.	705.132 +/- 4.512	705.132 +/- 4.512
Final.	0.000 +/- 0.000	0.000 +/- 0.000

G-value vs. LET: IRT



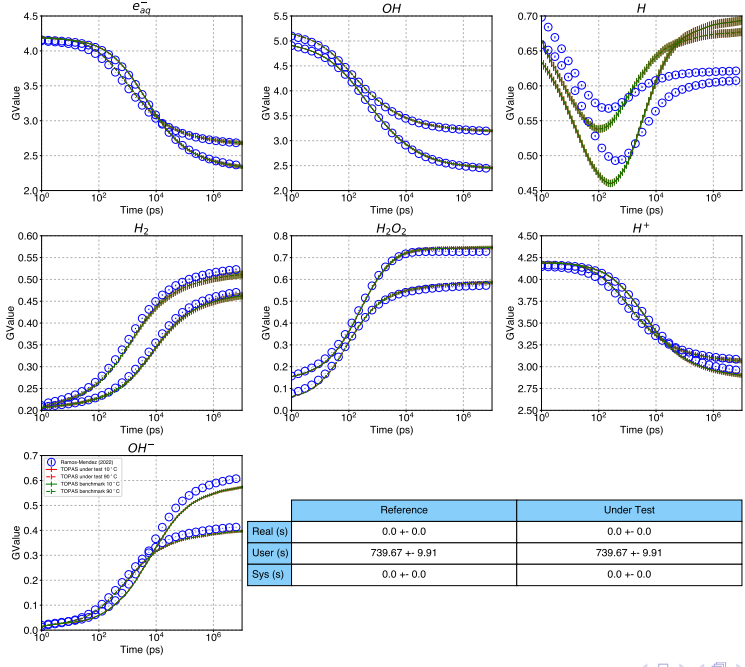
	TOPAS-Ref	TOPAS-Sut
Real	3301.326 +/- 121.620	3301.326 +/- 121.620
User	3274.968 +/- 121.352	3274.968 +/- 121.352
Sys	15.550 +/- 0.260	15.550 +/- 0.260

G-value of H_2O_2: IRT



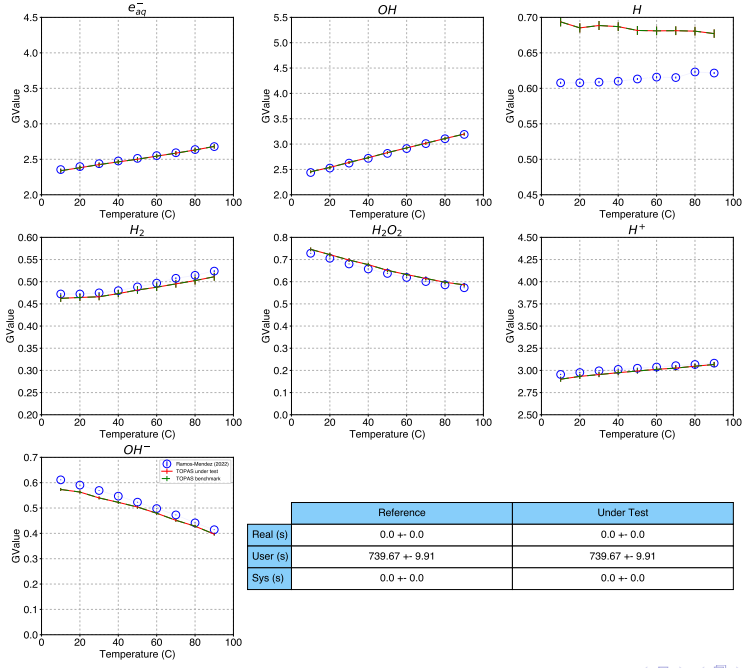
	Reference	Under Test
Real (s)	0.0 +- 0.0	0.0 +- 0.0
User (s)	889.52 +- 6.81	889.52 +- 6.81
Sys (s)	0.0 +- 0.0	0.0 +- 0.0

G-value and Temperature I: IRT



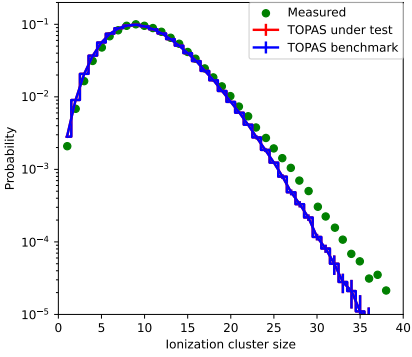
	Reference	Under Test
Real (s)	0.0 +- 0.0	0.0 +- 0.0
User (s)	739.67 +- 9.91	739.67 +- 9.91
Sys (s)	0.0 +- 0.0	0.0 +- 0.0

G-value and Temperature II: IRT

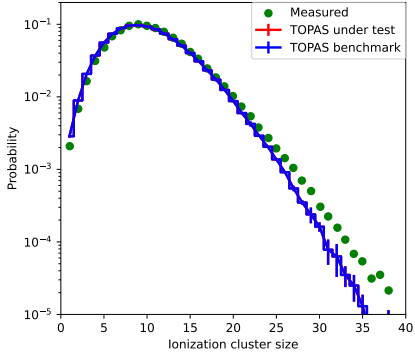


	Reference	Under Test
Real (s)	0.0 +- 0.0	0.0 +- 0.0
User (s)	739.67 +- 9.91	739.67 +- 9.91
Sys (s)	0.0 +- 0.0	0.0 +- 0.0

Nanodosimetry I: TsEmDNAPhysics and g4em-dna_opt2



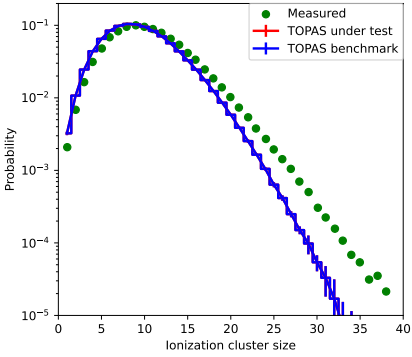
	TOPAS under test (s)	TOPAS benchmark (s)
Init.	0.0 +/- 0.0	0.0 +/- 0.0
Exec.	10376.5 +/- 37.9	10376.5 +/- 37.9
Final.	0.0 +/- 0.0	0.0 +/- 0.0



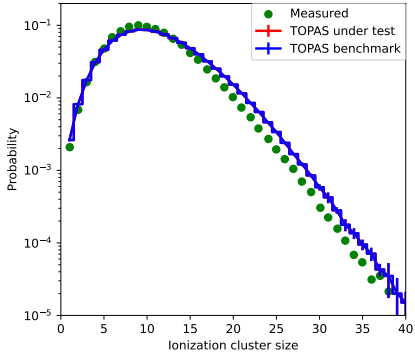
	TOPAS under test (s)	TOPAS benchmark (s)
Init.	0.0 +/- 0.0	0.0 +/- 0.0
Exec.	10122.7 +/- 36.3	10122.7 +/- 36.3
Final.	0.0 +/- 0.0	0.0 +/- 0.0

Conte V, Selva A, Colautti P, et al., Nanodosimetry: Towards a new concept of radiation quality. *Radiat Prot Dosimetry*. 2018;180(1-4):150-156. doi:10.1093/rpd/ncx175

Nanodosimetry I: g4em-dna_opt4 and g4em-dna_opt6



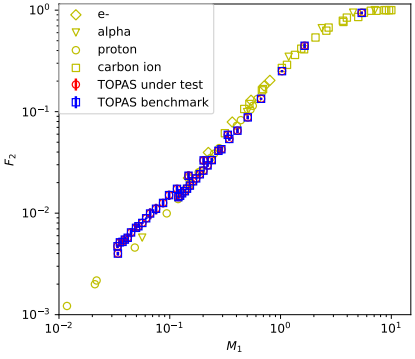
	TOPAS under test (s)	TOPAS benchmark (s)
Init.	0.0 +/- 0.0	0.0 +/- 0.0
Exec.	8561.3 +/- 16.4	8561.3 +/- 16.4
Final.	0.0 +/- 0.0	0.0 +/- 0.0



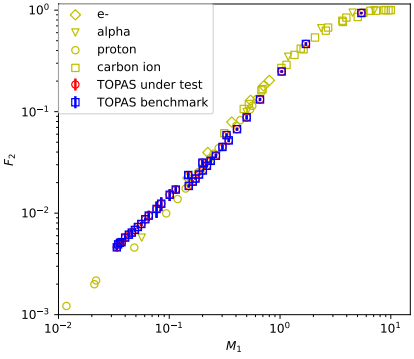
	TOPAS under test (s)	TOPAS benchmark (s)
Init.	0.0 +/- 0.0	0.0 +/- 0.0
Exec.	7770.8 +/- 37.7	7770.8 +/- 37.7
Final.	0.0 +/- 0.0	0.0 +/- 0.0

Conte V, Selva A, Colautti P, et al., Nanodosimetry: Towards a new concept of radiation quality. *Radiat Prot Dosimetry*. 2018;180(1-4):150-156. doi:10.1093/rpd/ncx175

Nanodosimetry II: TsEmDNAPhysics and g4em-dna_opt2



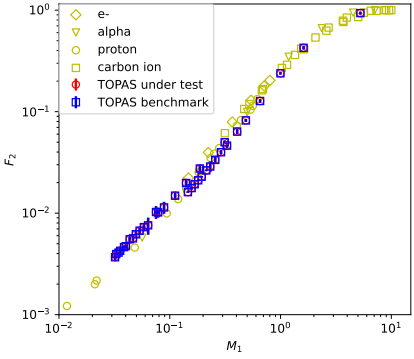
	TOPAS under test (s)	TOPAS benchmark (s)
Init.	0.0 +/- 0.0	0.0 +/- 0.0
Exec.	124.7 +/- 0.3	124.7 +/- 0.3
Final.	0.0 +/- 0.0	0.0 +/- 0.0



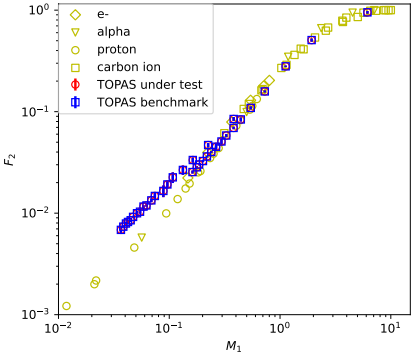
	TOPAS under test (s)	TOPAS benchmark (s)
Init.	0.0 +/- 0.0	0.0 +/- 0.0
Exec.	99.2 +/- 0.4	99.2 +/- 0.4
Final.	0.0 +/- 0.0	0.0 +/- 0.0

Conte V, Selva A, Colautti P, et al., Nanodosimetry: Towards a new concept of radiation quality. *Radiat Prot Dosimetry*. 2018;180(1-4):150-156. doi:10.1093/rpd/ncx175

Nanodosimetry II: g4em-dna_opt4 and g4em-dna_opt6



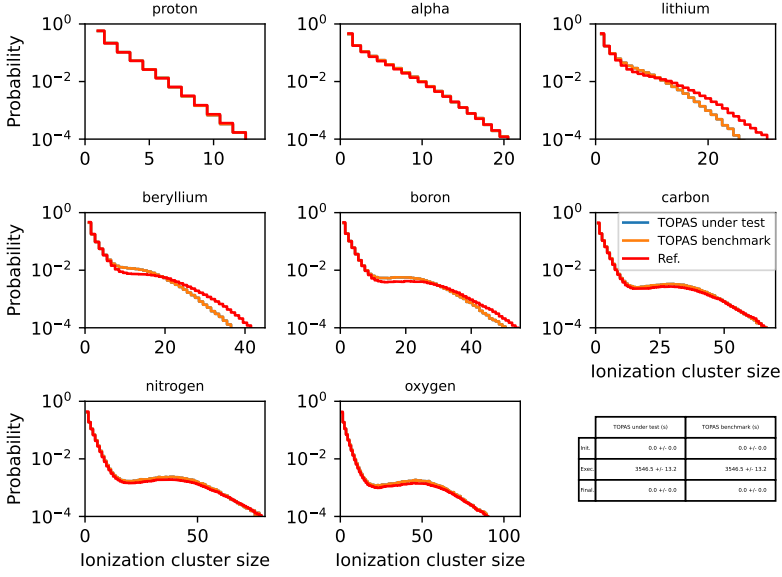
	TOPAS under test (s)	TOPAS benchmark (s)
Init.	0.0 +/- 0.0	0.0 +/- 0.0
Exec.	1414.8 +/- 1.6	1414.8 +/- 1.6
Final.	0.0 +/- 0.0	0.0 +/- 0.0



	TOPAS under test (s)	TOPAS benchmark (s)
Init.	0.0 +/- 0.0	0.0 +/- 0.0
Exec.	1033.1 +/- 0.6	1033.1 +/- 0.6
Final.	0.0 +/- 0.0	0.0 +/- 0.0

Conte V, Selva A, Colautti P, et al., Nanodosimetry: Towards a new concept of radiation quality. *Radiat Prot Dosimetry*. 2018;180(1-4):150-156. doi:10.1093/rpd/ncx175

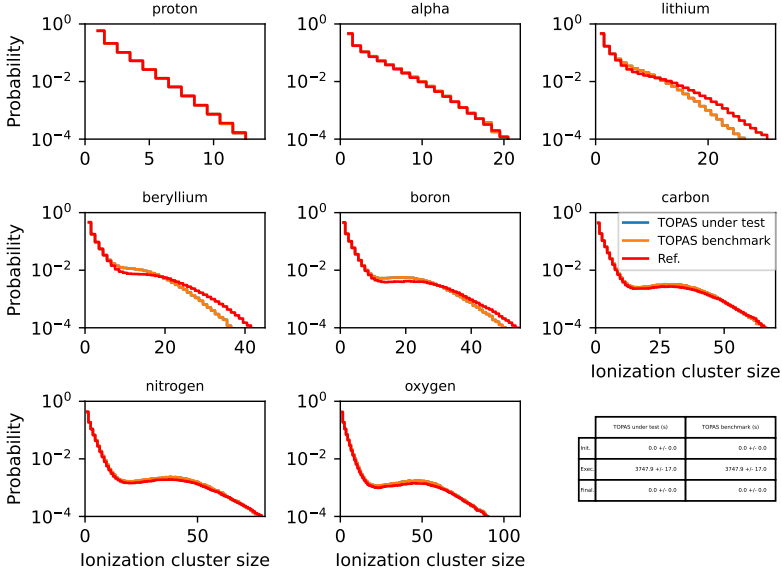
Nanodosimetry III: TsEmDNAPhysics



	TOPAS under test (s)	TOPAS benchmark (s)
Init.	0.0 +/- 0.0	0.0 +/- 0.0
Exec.	3546.5 +/- 13.2	3546.5 +/- 13.2
Final	0.0 +/- 0.0	0.0 +/- 0.0

- Ramos-Méndez J, Burigo LN, Schulte R, Chuang C, Faddegon B. Fast calculation of nanodosimetric quantities in treatment planning of proton and ion therapy. *Phys Med Biol*. 2018;63(23):235015. doi:10.1088/1361-6560/aaeeee

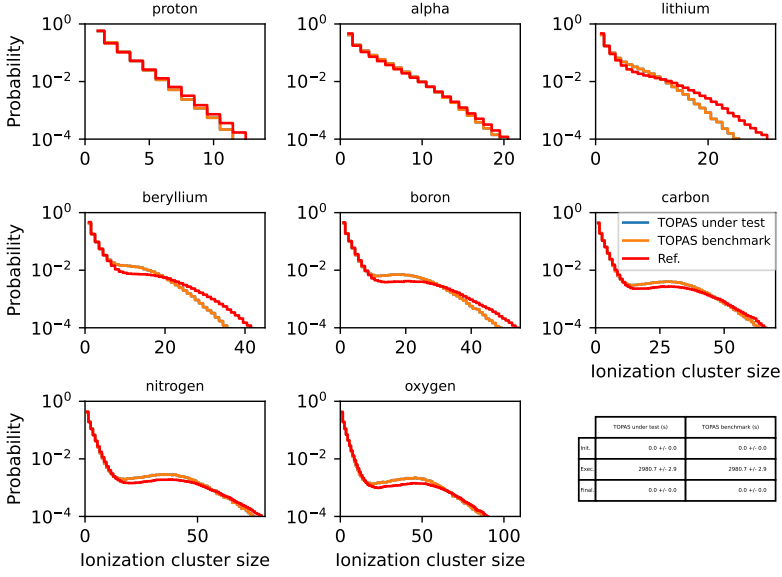
Nanodosimetry III: g4em-dna_opt2



	TOPAS under test (s)	TOPAS benchmark (s)
Init.	0.0 +/- 0.0	0.0 +/- 0.0
Exec.	3747.9 +/- 17.0	3747.9 +/- 17.0
Final	0.0 +/- 0.0	0.0 +/- 0.0

- Ramos-Méndez J, Burigo LN, Schulte R, Chuang C, Faddegon B. Fast calculation of nanodosimetric quantities in treatment planning of proton and ion therapy. *Phys Med Biol*. 2018;63(23):235015. doi:10.1088/1361-6560/aaeeee

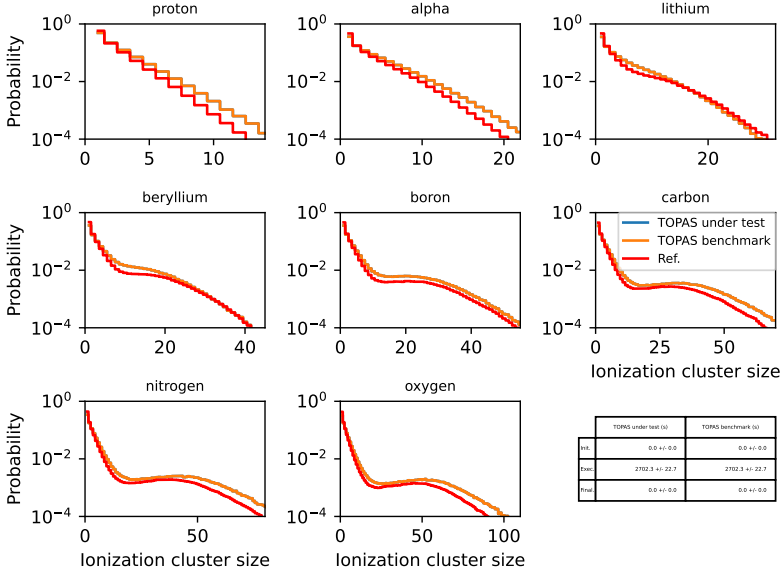
Nanodosimetry III: g4em-dna_opt4



	TOPAS under test (s)	TOPAS benchmark (s)
Init	0.0 +/- 0.0	0.0 +/- 0.0
Exec	2980.7 +/- 2.9	2980.7 +/- 2.9
Final	0.0 +/- 0.0	0.0 +/- 0.0

- Ramos-Méndez J, Burigo LN, Schulte R, Chuang C, Faddegon B. Fast calculation of nanodosimetric quantities in treatment planning of proton and ion therapy. *Phys Med Biol*. 2018;63(23):235015. doi:10.1088/1361-6560/aaeeee

Nanodosimetry III: g4em-dna_opt6



	TOPAS under test (s)	TOPAS benchmark (s)
Init.	0.0 +/- 0.0	0.0 +/- 0.0
Exec.	2702.3 +/- 22.7	2702.3 +/- 22.7
Final	0.0 +/- 0.0	0.0 +/- 0.0

- Ramos-Méndez J, Burigo LN, Schulte R, Chuang C, Faddegon B. Fast calculation of nanodosimetric quantities in treatment planning of proton and ion therapy. *Phys Med Biol*. 2018;63(23):235015. doi:10.1088/1361-6560/aaeeee