

Update on LUXE GEANT4 Simulation

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Simulation with QGSP_BER_HP physics list

- **QGSP_BERT_HP**: identical to QGSP_BERT except that neutrons of 20 MeV and lower use the High Precision neutron models and cross sections to describe elastic and inelastic scattering, capture and fission. The G4NDL database is required for this physics list. Moreover, RadioactiveDecay is activated.

- e-laser,
- IPStrong,
- 5000nm laser spot size
- 976 BX

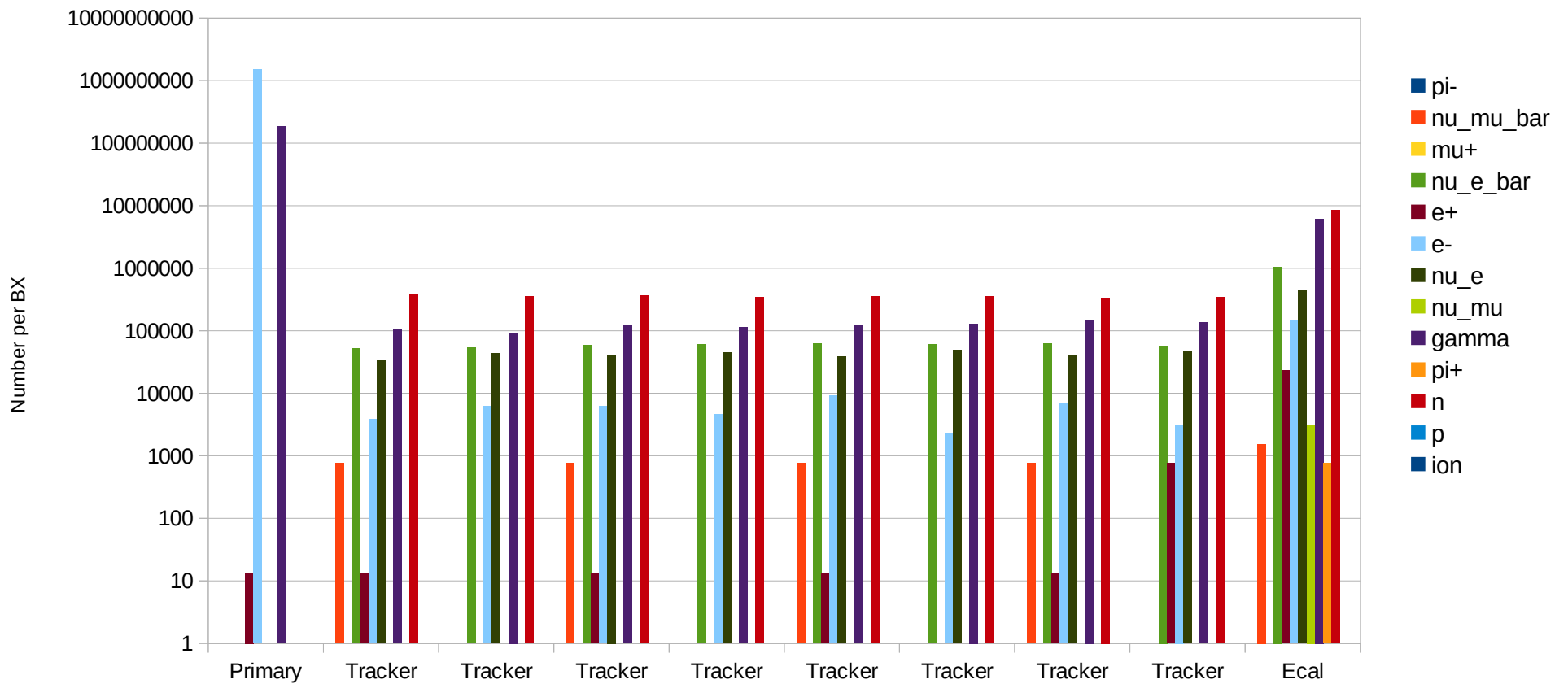
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                                Hadronic Processes for neutron  
  
Process: hadElastic  
  Model:                      hElasticCHIPS: 19.5 MeV ---> 100 TeV  
  Model:                      NeutronHPElastic: 0 eV ---> 20 MeV  
  Cr_sctns: NeutronHPElasticXS: 0 eV ---> 20 MeV  
  Cr_sctns: G4NeutronElasticXS: 0 eV ---> 100 TeV  
  
Process: neutronInelastic  
  Model:                      QGSP: 12 GeV ---> 100 TeV  
  Model:                      FTFP: 3 GeV ---> 25 GeV  
  Model:                      BertiniCascade: 19.9 MeV ---> 6 GeV  
  Model:                      NeutronHPInelastic: 0 eV ---> 20 MeV  
  Cr_sctns: NeutronHPInelasticXS: 0 eV ---> 20 MeV  
  Cr_sctns: BarashenkovGlauberGribov: 0 eV ---> 100 TeV  
  
Process: nCapture  
  Model:                      NeutronHPCapture: 0 eV ---> 20 MeV  
  Model:                      nRadCapture: 19.9 MeV ---> 100 TeV  
  Cr_sctns: NeutronHPCaptureXS: 0 eV ---> 20 MeV  
  Cr_sctns: G4NeutronCaptureXS: 0 eV ---> 100 TeV  
  
Process: nFission  
  Model:                      NeutronHPFission: 0 eV ---> 20 MeV  
  Model:                      G4LFission: 19.9 MeV ---> 100 TeV  
  Cr_sctns: NeutronHPFissionXS: 0 eV ---> 20 MeV  
  Cr_sctns: GheishaFissionXS: 0 eV ---> 100 TeV
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Particles in detectors

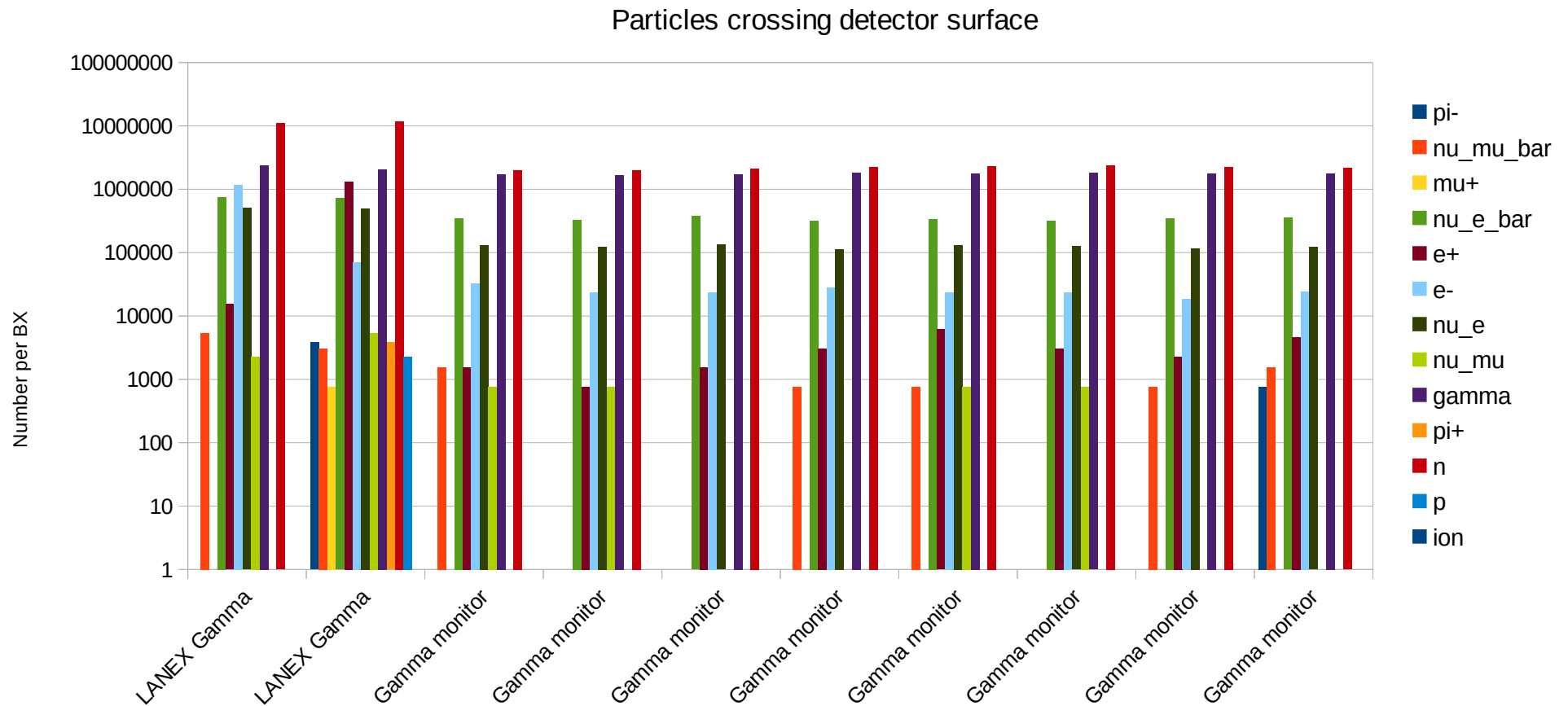
Detector_ID	Detector	-211	-14	-13	-12	-11	11	12	14	22	211	2112	2212	1000020030
		pi-	nu_mu_bar	mu+	nu_e_bar	e+	e-	nu_e	nu_mu	gamma	pi+	n	p	ion
-1	Primary	0	0	0	0	13.1598	1.50E+09	0	0	1.87E+08	0	0	0	0
1000	Tracker	0	768.443	0	52254.1	13.1096	3842.42	33043	0	102973	0	371926	0	0
1001	Tracker	0	0	0	53022.5	0.119877	6147.55	43032.8	0	92982.3	0	354252	0	0
1002	Tracker	0	768.443	0	59170.1	13.0984	6147.75	41495.9	0	119112	0	365010	0	0
1003	Tracker	0	0	0	59938.5	0.152664	4610.68	44569.7	0	114499	0	346568	0	0
1004	Tracker	0	768.443	0	62243.9	13.0738	9221.54	38422.1	0	120651	0	351178	0	0
1005	Tracker	0	0.00102459	0	60707	0.21209	2305.35	48411.9	0	129868	0	355021	0	0
1006	Tracker	0	768.444	0	62243.9	13.0553	6916.34	40727.5	0.00102459	146017	0	329662	0.00102459	0
1007	Tracker	0	0	0	56096.3	768.733	3073.81	47643.4	0.00102459	134479	0	345799	0	0
2000	Ecal	0	1536.89	0	1.06E+06	23067.6	143708	448771	3073.77	6.18E+06	768.443	8.53E+06	0	0
3000	LANEX Gamma	0	5379.1	0	747695	15368.9	1.18E+06	504867	2305.33	2.42E+06	0	1.10E+07	0	0
3001	LANEX Gamma	3842.21	3073.77	768.443	719262	1.32E+06	69928.3	502561	5379.1	2.08E+06	3842.21	1.17E+07	2305.33	0
4000	Gamma monitor	0	1536.89	0	350410	1536.89	33043	131404	768.443	1.74E+06	0	2.02E+06	0	0
4001	Gamma monitor	0	0	0	329662	768.442	23821.7	125256	768.443	1.68E+06	0	2.00E+06	0	0
4002	Gamma monitor	0	0	0	375768	1536.89	23821.7	133709	0	1.73E+06	0	2.15E+06	0	0
4003	Gamma monitor	0	768.443	0	320441	3073.77	28432.4	112961	0	1.82E+06	0	2.23E+06	0	0
4004	Gamma monitor	0	768.443	0	341189	6147.54	23821.7	132941	768.443	1.78E+06	0	2.33E+06	0	0
4005	Gamma monitor	0	0	0	321977	3073.77	23821.7	126025	768.443	1.81E+06	0	2.41E+06	0	0
4006	Gamma monitor	0	768.443	0	348873	2305.33	18442.6	117572	0	1.78E+06	0	2.27E+06	0	0
4007	Gamma monitor	768.443	1536.89	0	353484	4610.65	24590.2	122182	0	1.76E+06	0	2.15E+06	0	0
6000	Brems monitor screen	0	0	0	116035	0	2305.33	53022.5	0	136014	0	498719	0	0
6100	Brems monitor Cherenkov	0	0	0	205174	768.443	3073.77	82223.4	0	265113	0	1.05E+06	0	0
6200	Electron screen	0	2305.33	0	514857	10758.2	1.25E+08	514857	4610.66	1.04E+07	0	5.56E+06	2305.33	768.443
6300	Electron Cherenkov	0	4610.66	0	1.15E+06	734631	1.54E+09	859119	6147.54	1.59E+08	0	1.31E+07	6147.54	0
6500	Gamma Cherenkov	768.443	6915.98	0	1.65E+06	20748	1.17E+06	751537	1536.89	5.51E+06	0	1.99E+07	0	0
6501	Gamma Cherenkov	5379.1	3842.21	0	1.61E+06	932121	188268	769980	9989.75	5.45E+06	4610.66	2.06E+07	6915.98	0
8000	Beam profiler	0	19979.5	0	231301	315830	3.33E+06	2.21E+06	23053.3	2.36E+08	768.443	1.37E+07	1536.89	0
8001	Beam profiler	0	20748	0	232070	497951	2.87E+06	2.27E+06	23821.7	2.37E+08	768.443	1.41E+07	1536.89	0
8002	Beam profiler	0	0	0	134477	723873	783043	82991.8	768.443	1.85E+08	0	2.04E+06	1536.89	0
8003	Beam profiler	768.443	0	0	138320	910604	989754	85297.1	768.443	1.85E+08	0	2.07E+06	768.443	0

Particles in detectors

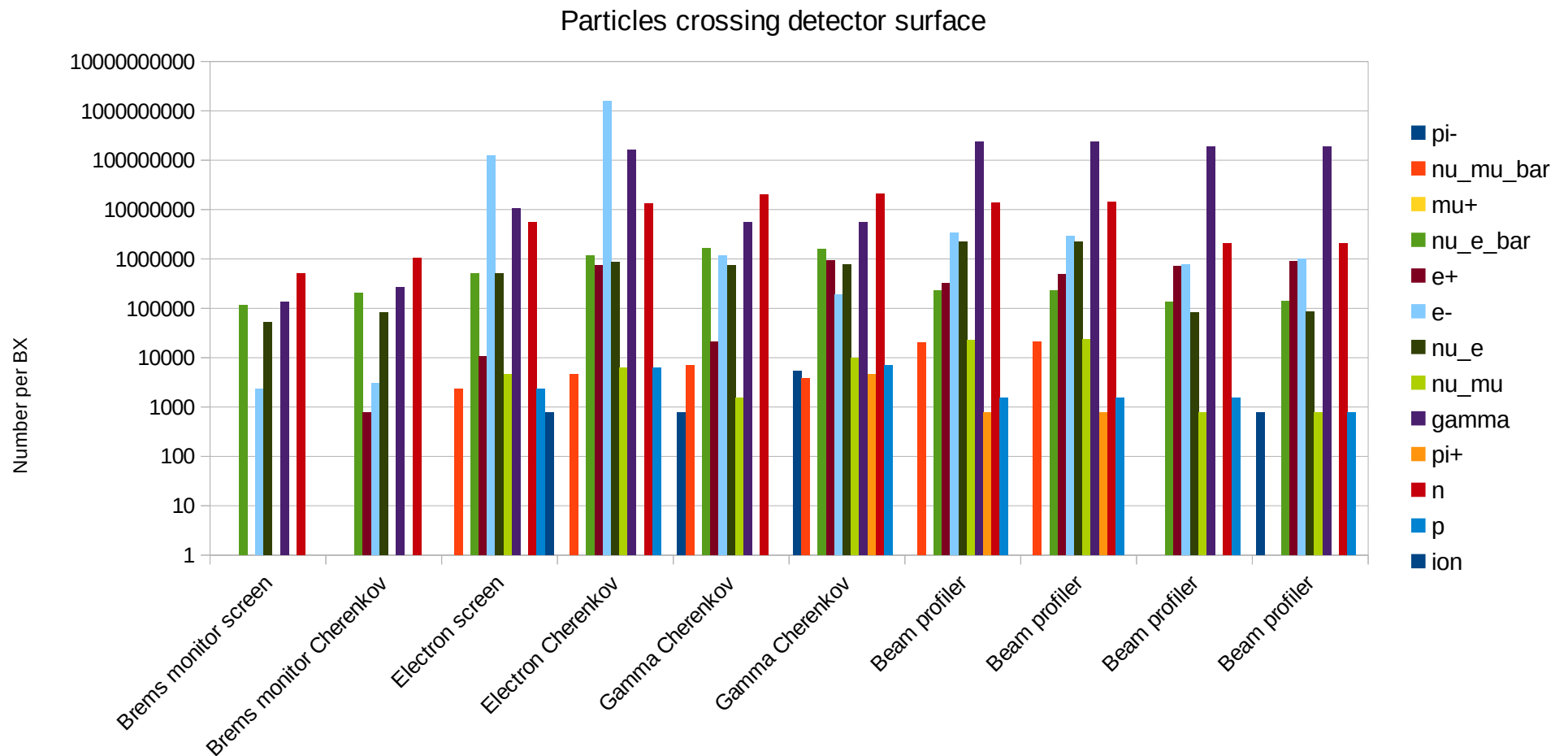
Particles crossing detector surface



Particles in detectors

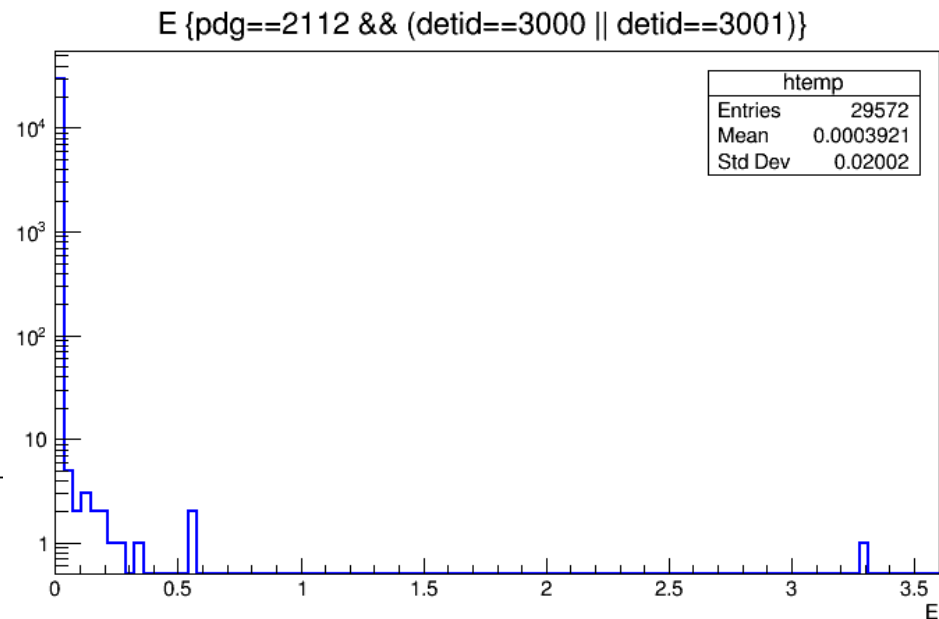
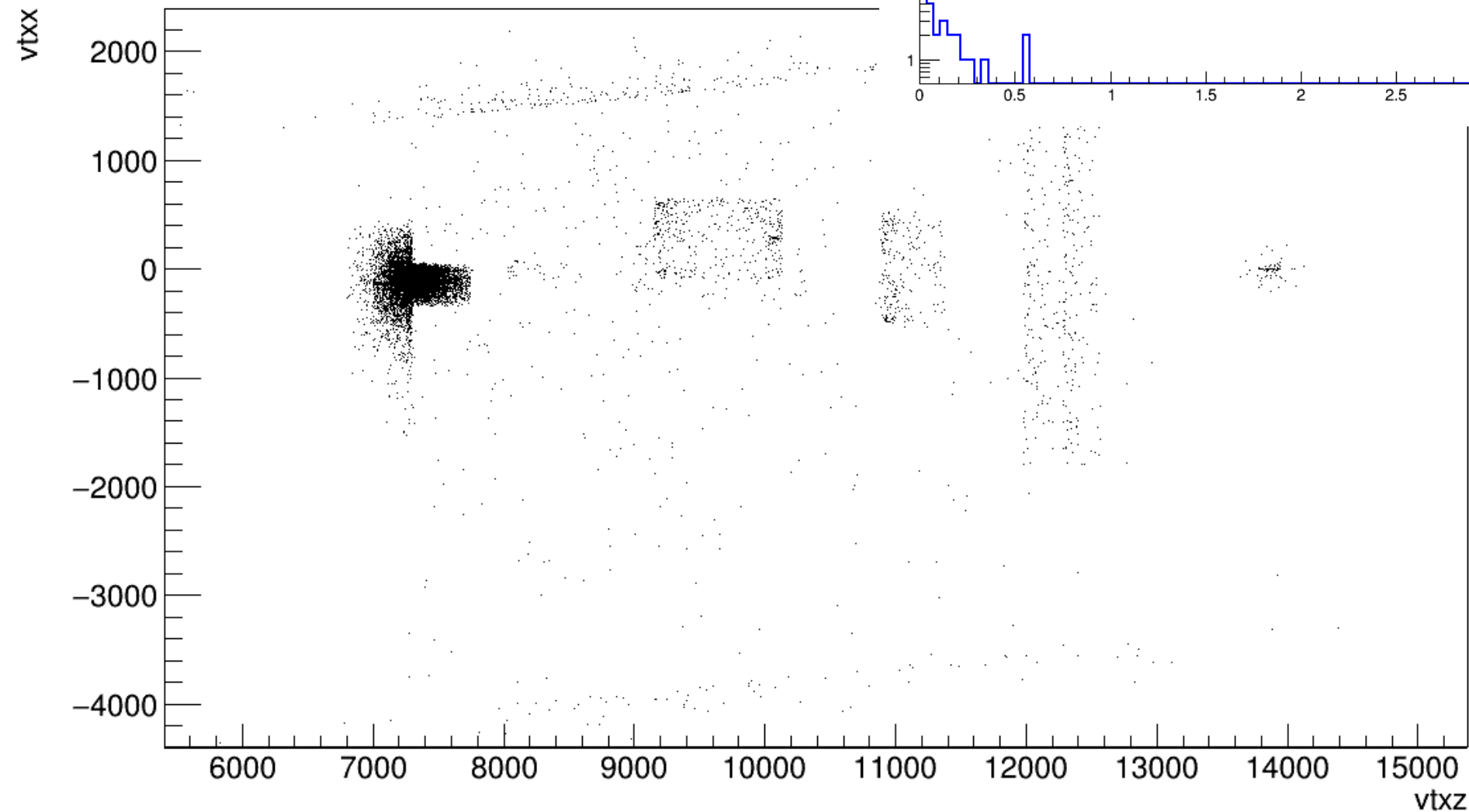


Particles in detectors

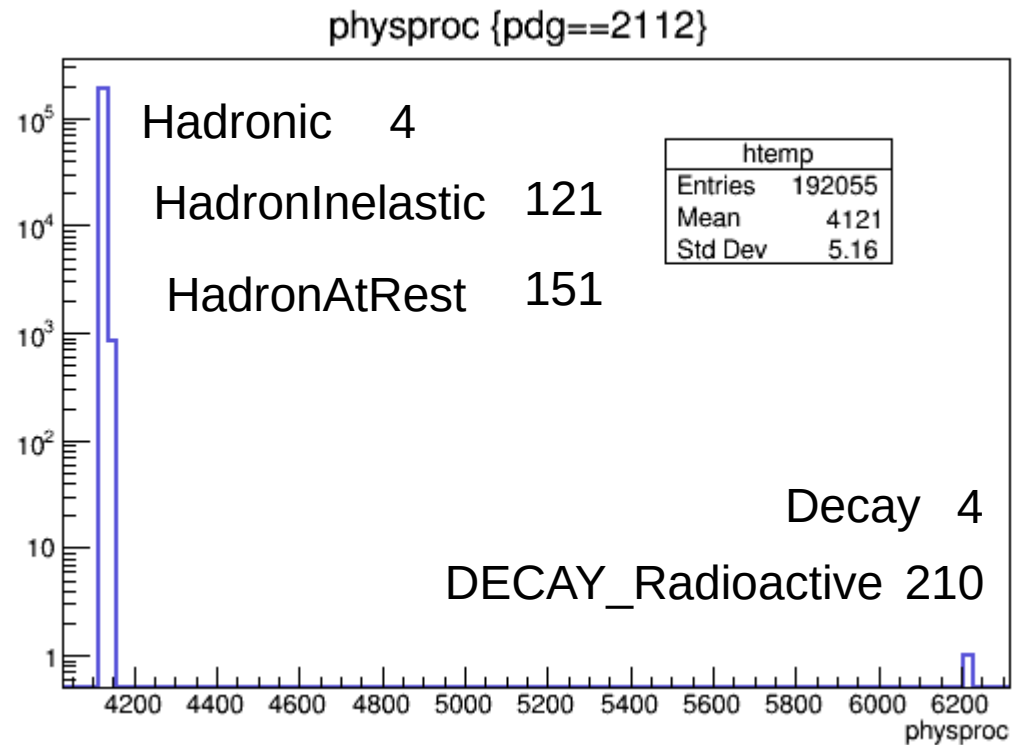


Neutrons in gamma spectrometer LANEX

vtxx:vtxz {pdg==2112 && (detid==



Neutron production processes



Energy deposited in 300um of silicon by neutrons of different energy

Kinetic energy (eV)	Energy deposited (eV)	E_dep sigma (eV)
1.00E+08	5128	830.5
1.00E+07	3409	392.4
1.00E+06	283.7	14.13
1.00E+05	11.31	0.9634
1.00E+04	1.923	0.1295
1.00E+03	0.2057	0.01359
1.00E+02	0.03456	0.01353
1.00E+01	0.002168	0.0001448
1.00E+00	0.02786	0.01797
1.00E-01	0.1455	0.06049
5.00E-02	0.2116	0.07017
3.00E-02	0.2679	0.07448
2.50E-02	0.3158	0.08141
2.00E-02	0.9723	0.6474

