

MIDAS data: statistics and rates.

Part 2

Igor Zhitnikov

2023-07-28@MONUMENT

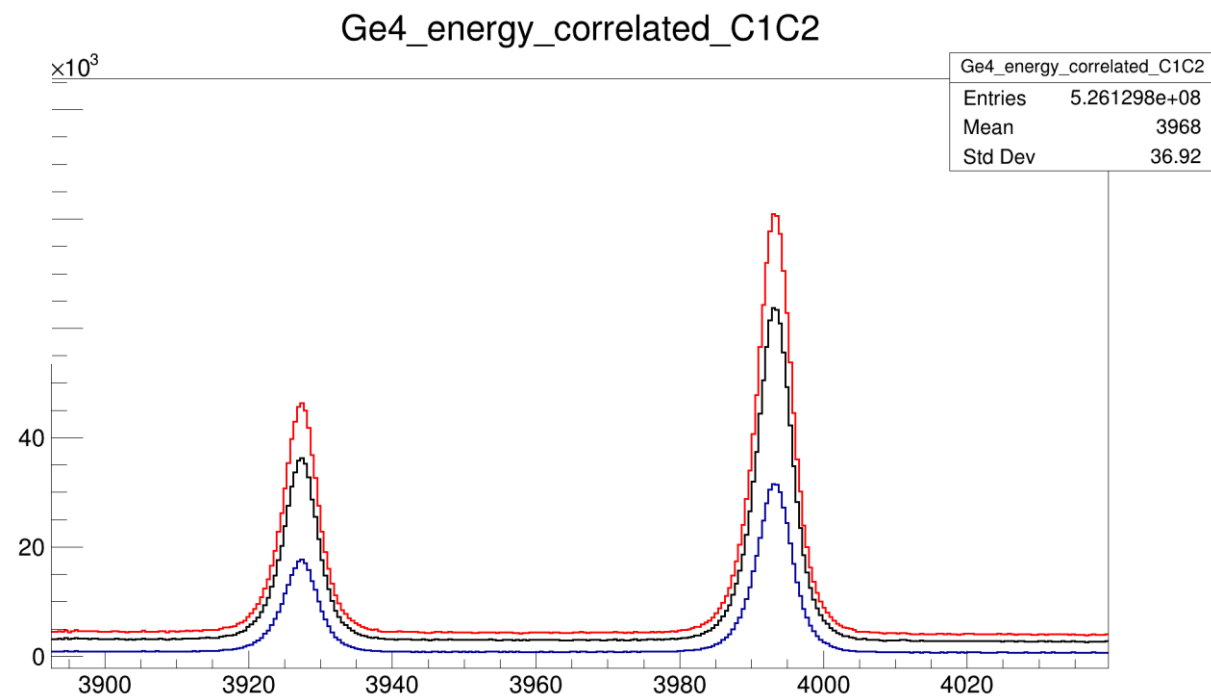
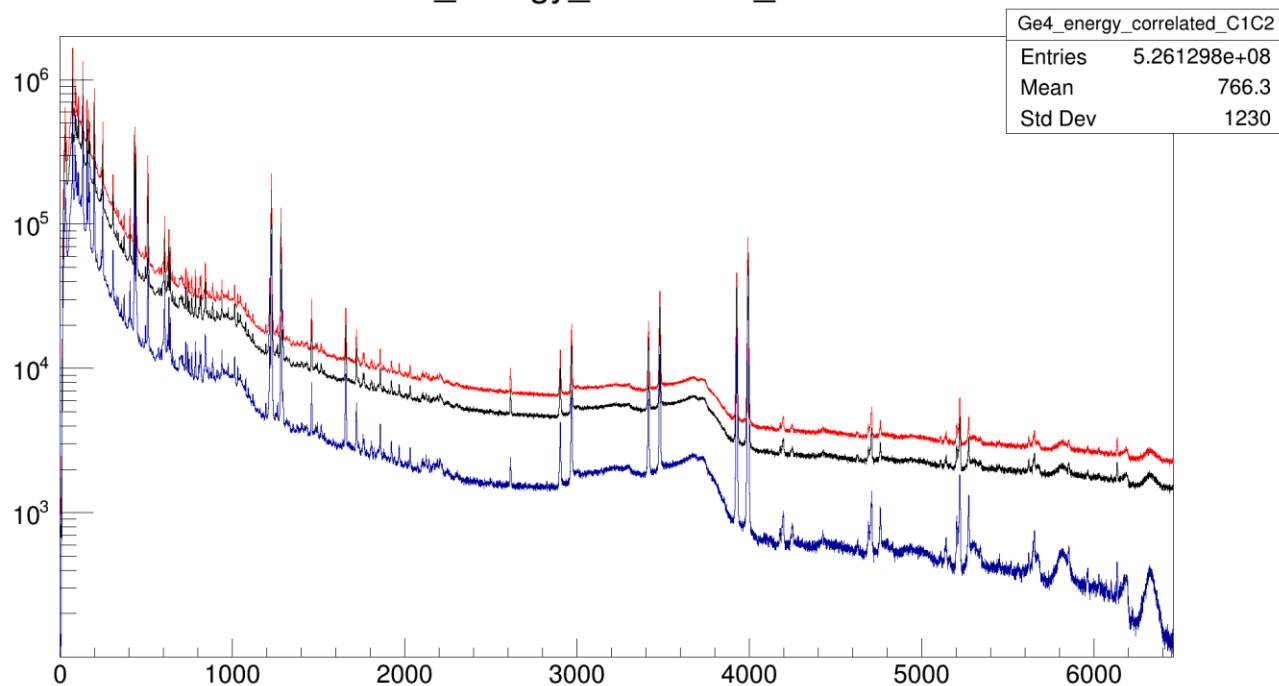
Ge&C1C2 [-200,1000]ns statistics and rates

(energy for Ge events at range [100,4500] keV)

	Statistics					Rates (events per second)			
Ba136 total	total	C1C2	C1C2C0	C1C2C0C3		total	C1C2	C1C2C0	C1C2C0C3
Ge1	1187M	547M	394M	152M		1830	844	607	235
Ge2	732M	349M	250M	94M		1128	538	386	145
Ge3	1150M	527M	377M	149M		1772	812	581	229
Ge4	1025M	470M	338M	133M		1580	725	521	204
Ge5	1383M	644M	468M	186M		2132	993	722	287
Ge6	748M	356M	259M	97M		1153	548	399	149
Ge7	1004M	472M	344M	136M		1547	728	530	209
Ge8	1198M	573M	418M	166M		1846	883	644	256
Se76	Statistics					Rates (events per second)			
	total	C1C2	C1C2C0	C1C2C0C3		total	C1C2	C1C2C0	C1C2C0C3
Ge1	1230M	617M	472M	222M		2717	1364	1043	491
Ge2	772M	393M	300M	137M		1706	869	662	302
Ge3	1180M	589M	450M	212M		2606	1302	993	468
Ge4	1053M	525M	402M	189M		2327	1161	888	418
Ge5	1453M	736M	567M	270M		3211	1626	1253	596
Ge6	781M	397M	305M	139M		1726	877	673	306
Ge7	1083M	552M	426M	204M		2394	1220	941	450
Ge8	1320M	684M	528M	250M		2916	1510	1167	552

C0C1(red), C1C2C0 (black), C1C2C0C3(blue)

Ge4_energy_correlated_C1C2

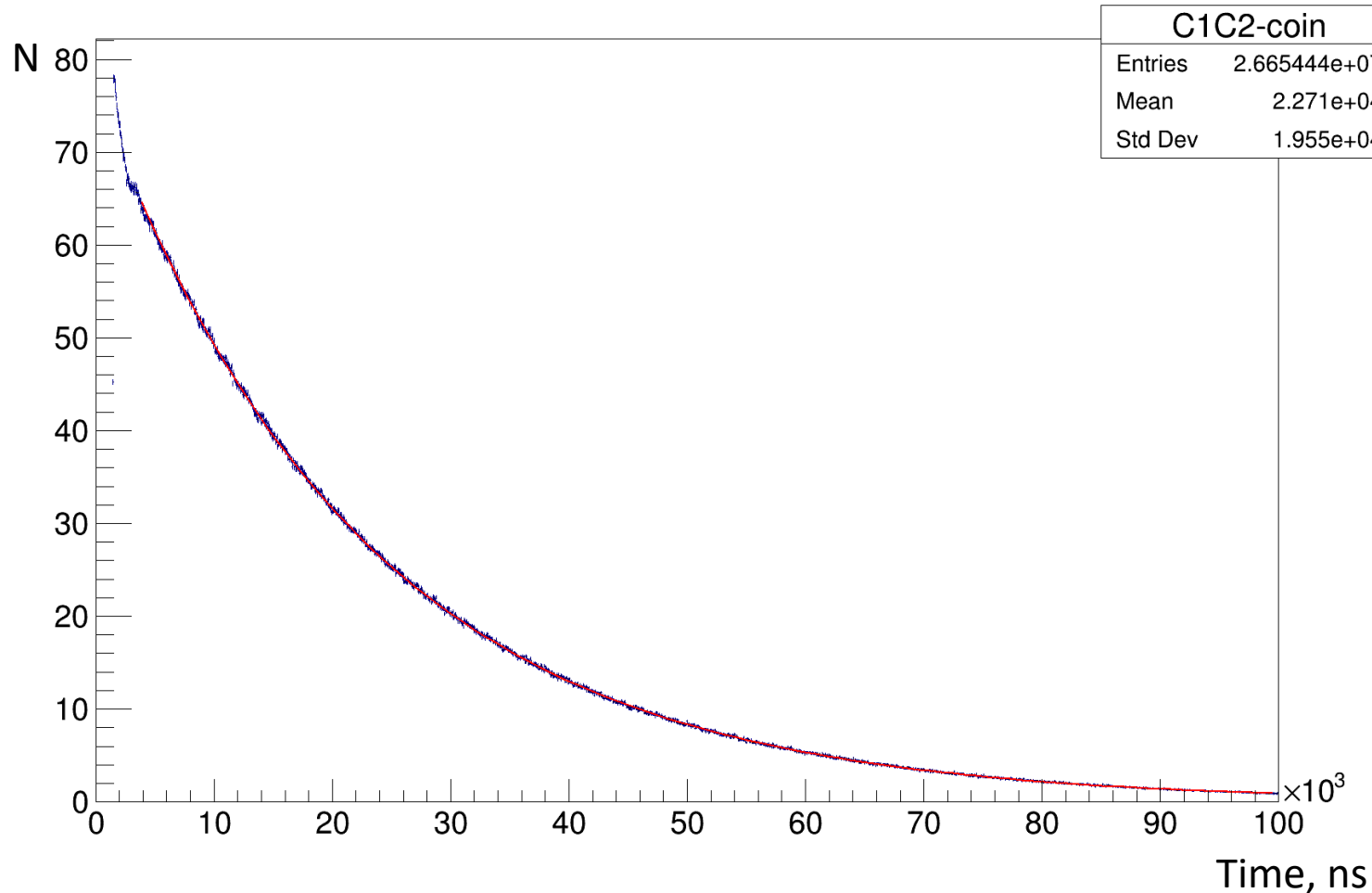


Ge&C1C2 statistics and rates (total)

Ba136 total	Statistics					Rates (events per second)			
	total	C1C2	C1C2C0	C1C2C0C3		total	C1C2	C1C2C0	C1C2C0C3
Ge1	1853M	839M	587M	191M		2855	1293	904	295
Ge2	1352M	635M	441M	136M		2083	978	679	209
Ge3	1866M	844M	593M	200M		2875	1301	914	308
Ge4	1678M	756M	536M	179M		2586	1166	826	275
Ge5	2171M	992M	706M	241M		3345	1529	1088	371
Ge6	1374M	639M	452M	138M		2118	984	697	213
Ge7	1526M	708M	507M	165M		2352	1091	782	254
Ge8	1819M	857M	615M	196M		2804	1320	948	302

Se76	Statistics					Rates (events per second)			
	total	C1C2	C1C2C0	C1C2C0C3		total	C1C2	C1C2C0	C1C2C0C3
Ge1	1651M	799M	593M	260M		3648	1765	1309	575
Ge2	1183M	585M	429M	179M		2614	1292	947	394
Ge3	1636M	789M	587M	257M		3614	1744	1297	569
Ge4	1459M	702M	525M	230M		3223	1552	1159	507
Ge5	1955M	955M	717M	319M		4319	2110	1585	704
Ge6	1194M	584M	434M	181M		2638	1290	958	399
Ge7	1414M	697M	526M	236M		3125	1539	1162	520
Ge8	1676M	839M	633M	279M		3703	1853	1400	617

C1C2 coincidence rate and dead times



Time distribution between 2 nearest events:

$$P(\Delta t) \approx e^{-\nu t}$$

Where ν is a rate of events

For 3 files at ^{136}Ba run1 for time between nearest C1C2 ($|T_{C1} - T_{C2}| < 100\text{ns}$) events

$$\nu = 4.43 \cdot 10^4 \text{ ev./s}$$

Dead time:

We have 1.4mks dead time
after each C# event

^{136}Ba

$$\text{C0: } 3.0 \cdot 10^4 \times 1.4 \cdot 10^{-6} = 4.2 \cdot 10^{-2} \text{ or } 4.2\%$$

$$\text{C1: } 4.6 \cdot 10^4 \times 1.4 \cdot 10^{-6} = 6.4 \cdot 10^{-2} \text{ or } 6.4\%$$

$$\text{C2: } 4.7 \cdot 10^4 \times 1.4 \cdot 10^{-6} = 6.6 \cdot 10^{-2} \text{ or } 6.6\%$$

$$\text{C3: } 3.1 \cdot 10^4 \times 1.4 \cdot 10^{-6} = 4.3 \cdot 10^{-2} \text{ or } 4.3\%$$