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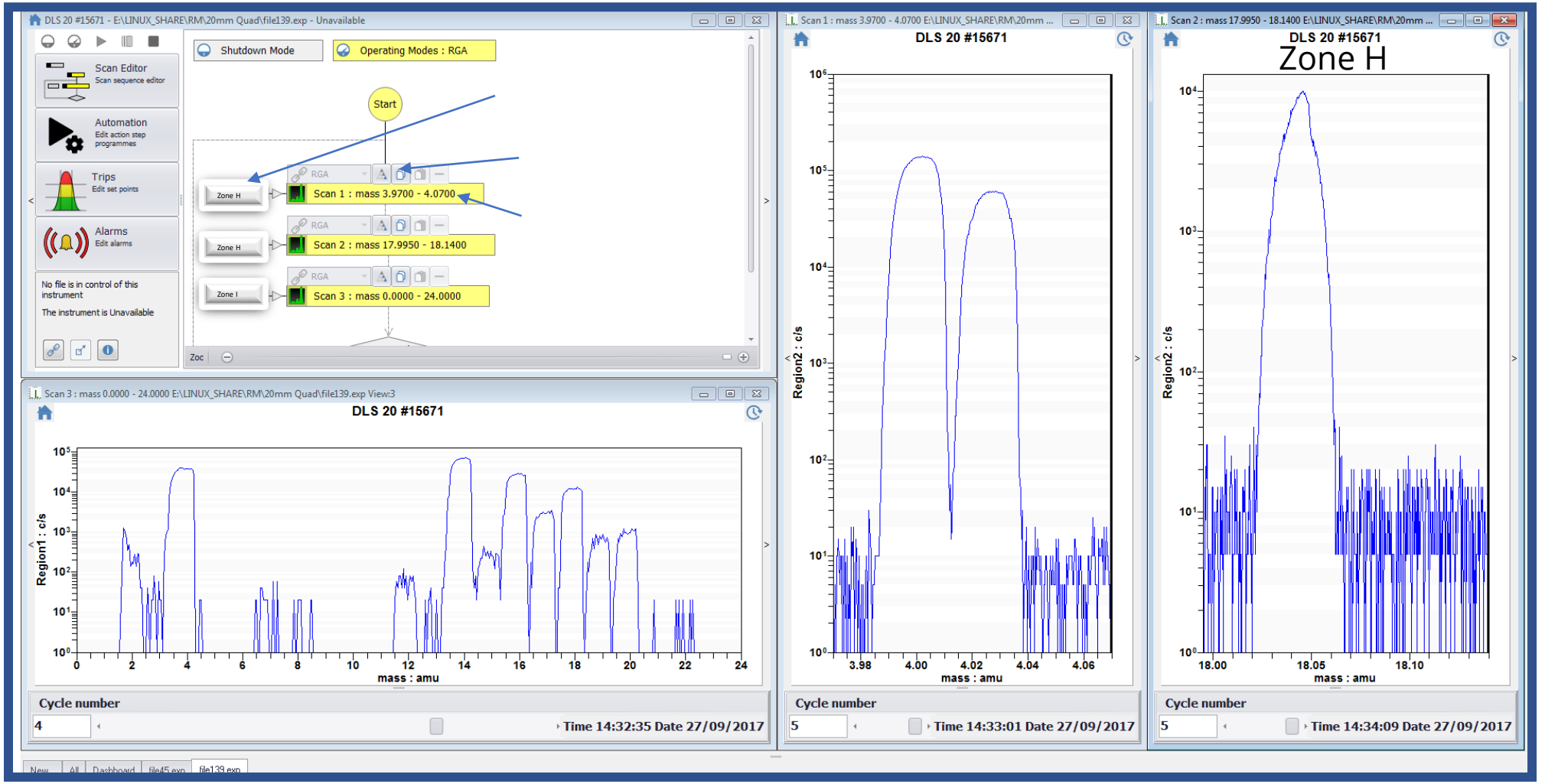
HIDEN ANALYTICAL

Hiden DLS-20 QMS

Zone H yields Ultra High Resolution Quadrupole Mass Spectrometer Specifically for the Analysis of Hydrogen, Hydrogen Isotopes and Light gases

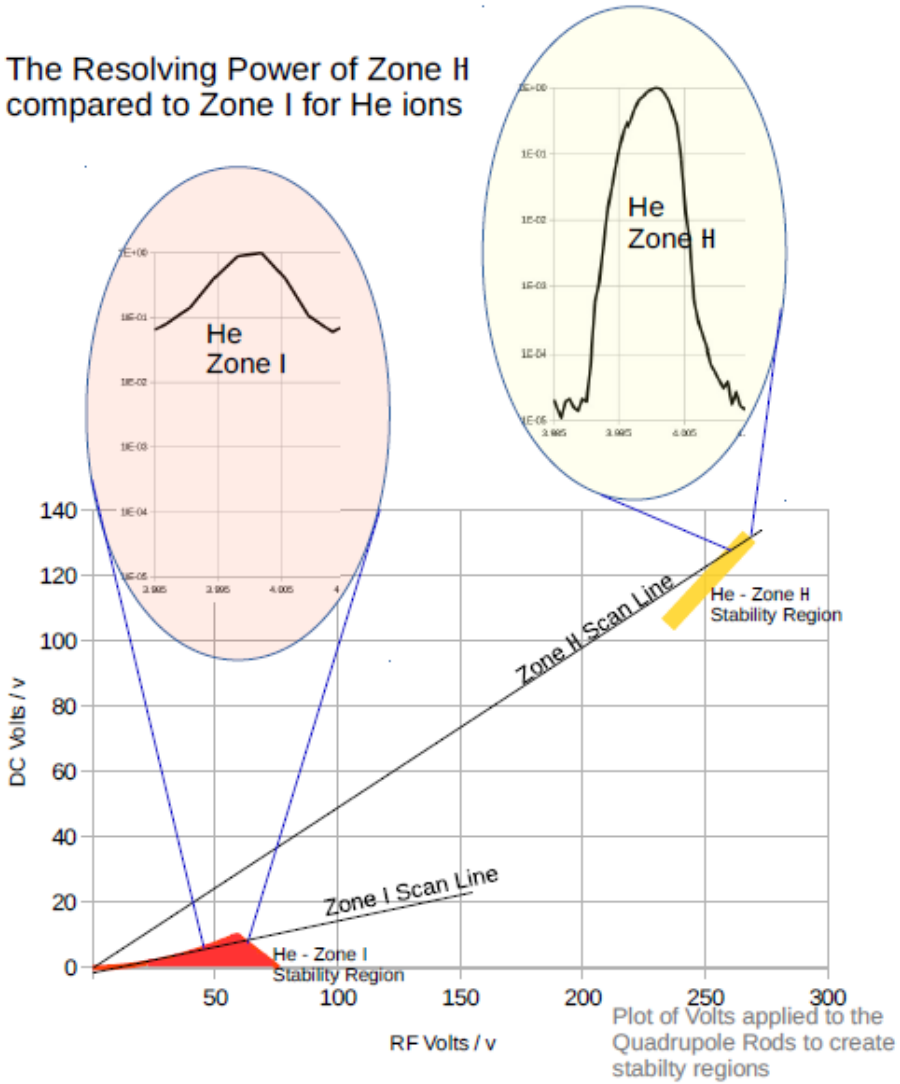
- 1 Hiden's
- 2 software
- 3 enables Zone 1 and H scans -
- Zone I
- H

even within the same event sequence!



Only the Resolving Power of Zone H gives ultimate detection limit for He in D_2

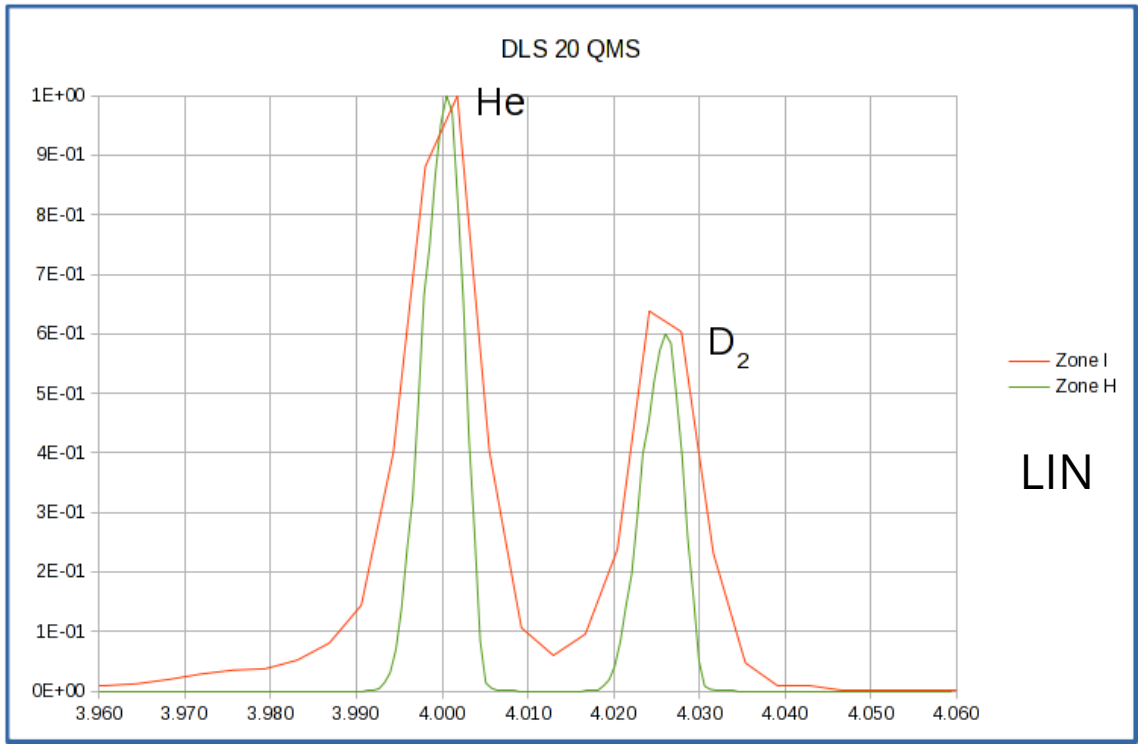
Quadrupoles operate with RF and DC Voltages applied to their rods which then carry ions to the detector
Certain voltage combinations can create 'stability regions' that transmit only ions of a particular m/z
Scanning the Quad's Voltages across the tips of these regions will carry only that ion to the detector
The Zone I region is most often used. However, a second region, Zone H, offers much greater Resolving Power – which helps separate adjacent masses
But only Quadrupole Electronics with both high power and stability can operate in this Zone
Hiden's High Power Electronics is now offered with selectable Zone H capability for masses up to 20 amu and Zone I for masses up to 200 amu – in a single package

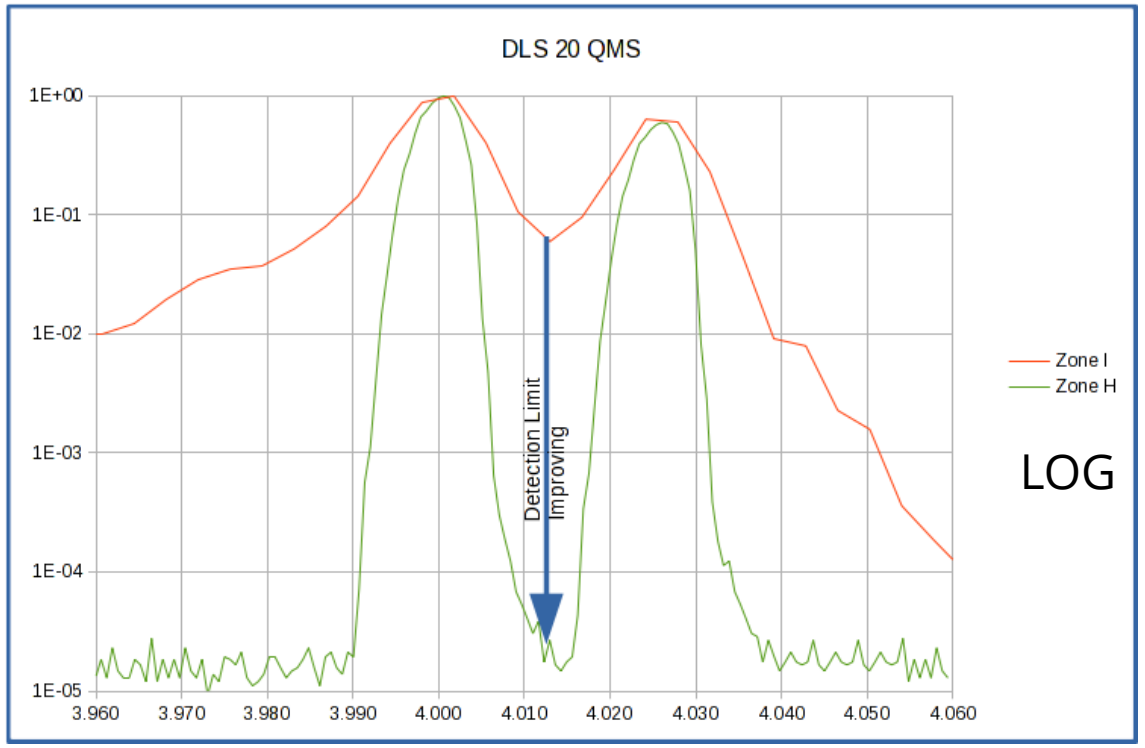


Plot of Volts applied to the Quadrupole Rods to create stabilty regions

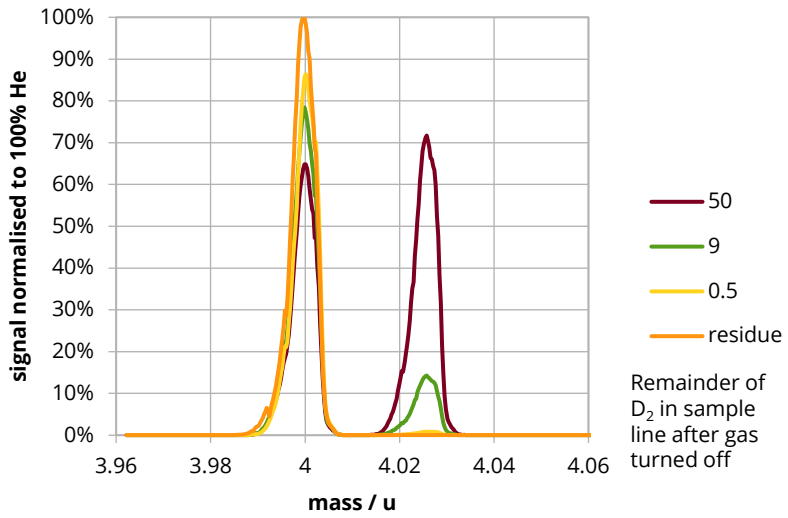
Mass	Component	Exact Mass Value (u)		Mass	Component	Exact Mass Value (u)
1	H^+	1.0078252		4	$^4He^+$ HT^4 D_2^+ H_2D^+	4.002600 4.023875 4.028204 4.029650
2	D^+ H_2^+	2.014102 2.0151018		5	DT^+ H_2T^+ D_2H^+ HeH^+	5.03005 5.03170 5.035825 5.01045
3	$^3He^+$ T^+ HD^+ H_3^+	3.016030 3.016050 3.021825 3.023475		6	T^+ D_2^+ $^{12}C^{++}$ HeD^+	6.032 6.042 5.999 6.0168

Detection Limits for He in D_2 depend on the Resolving Power of the Quadrupole. The benefits of operation in Zone II are clearly demonstrated – detection limit enhanced by almost four orders of magnitude!



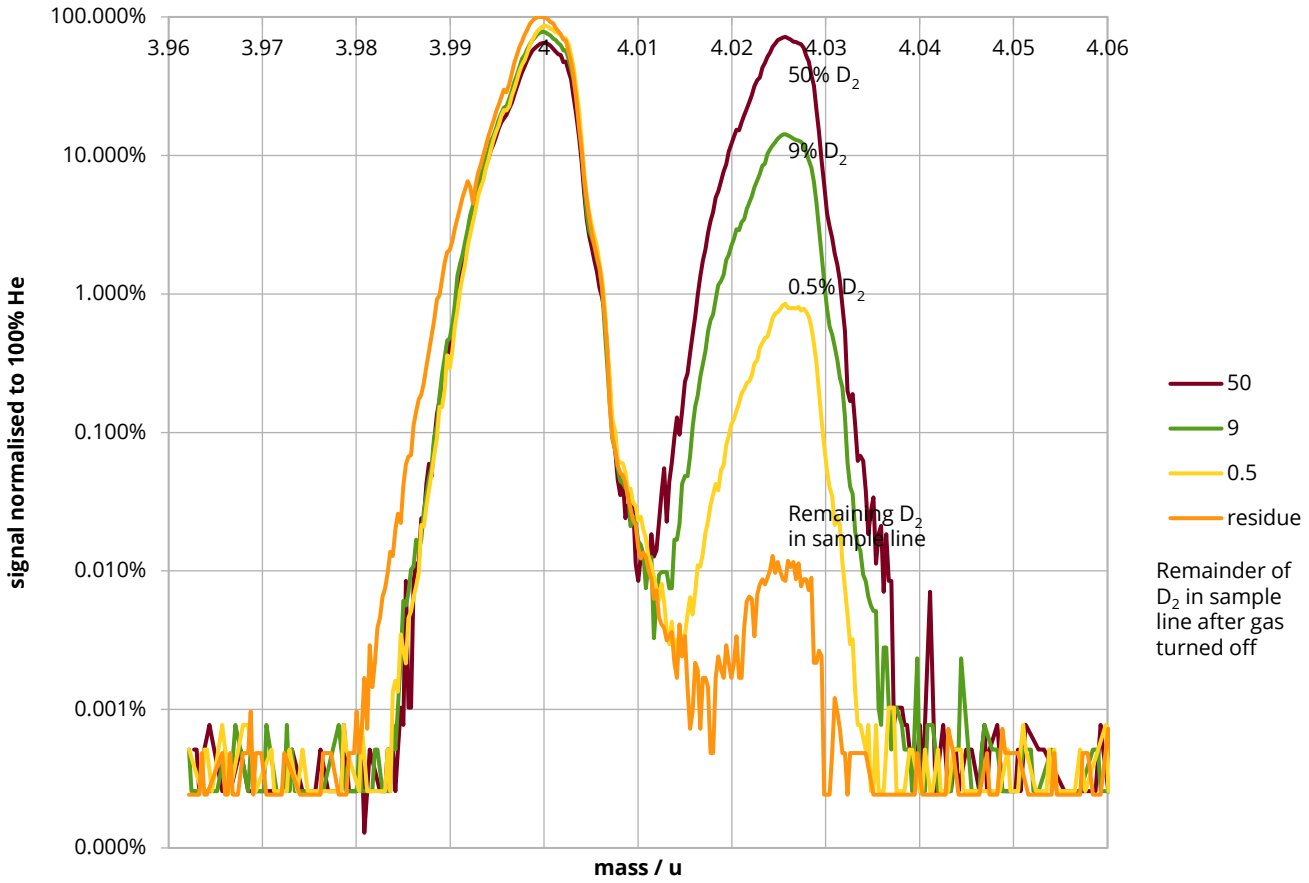


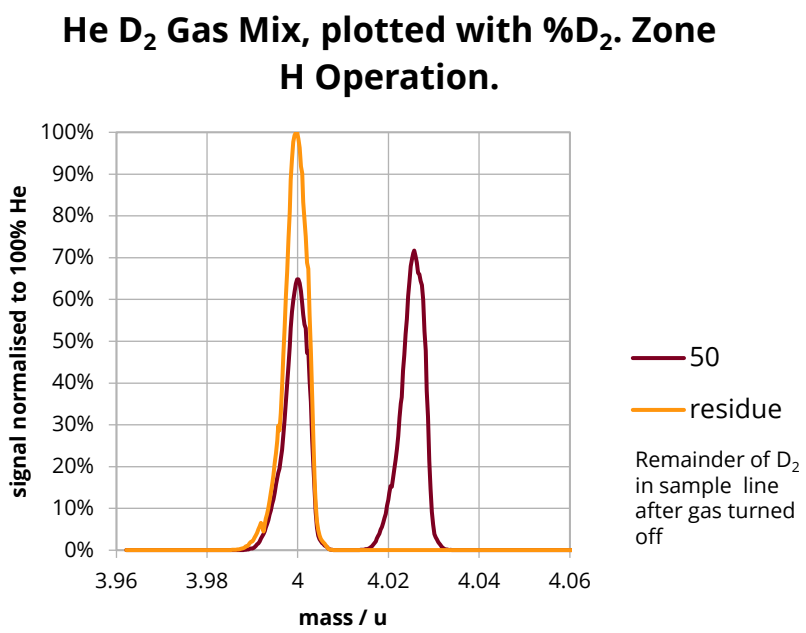
He D_2 Gas Mix, plotted with %D_2. Zone II Operation.

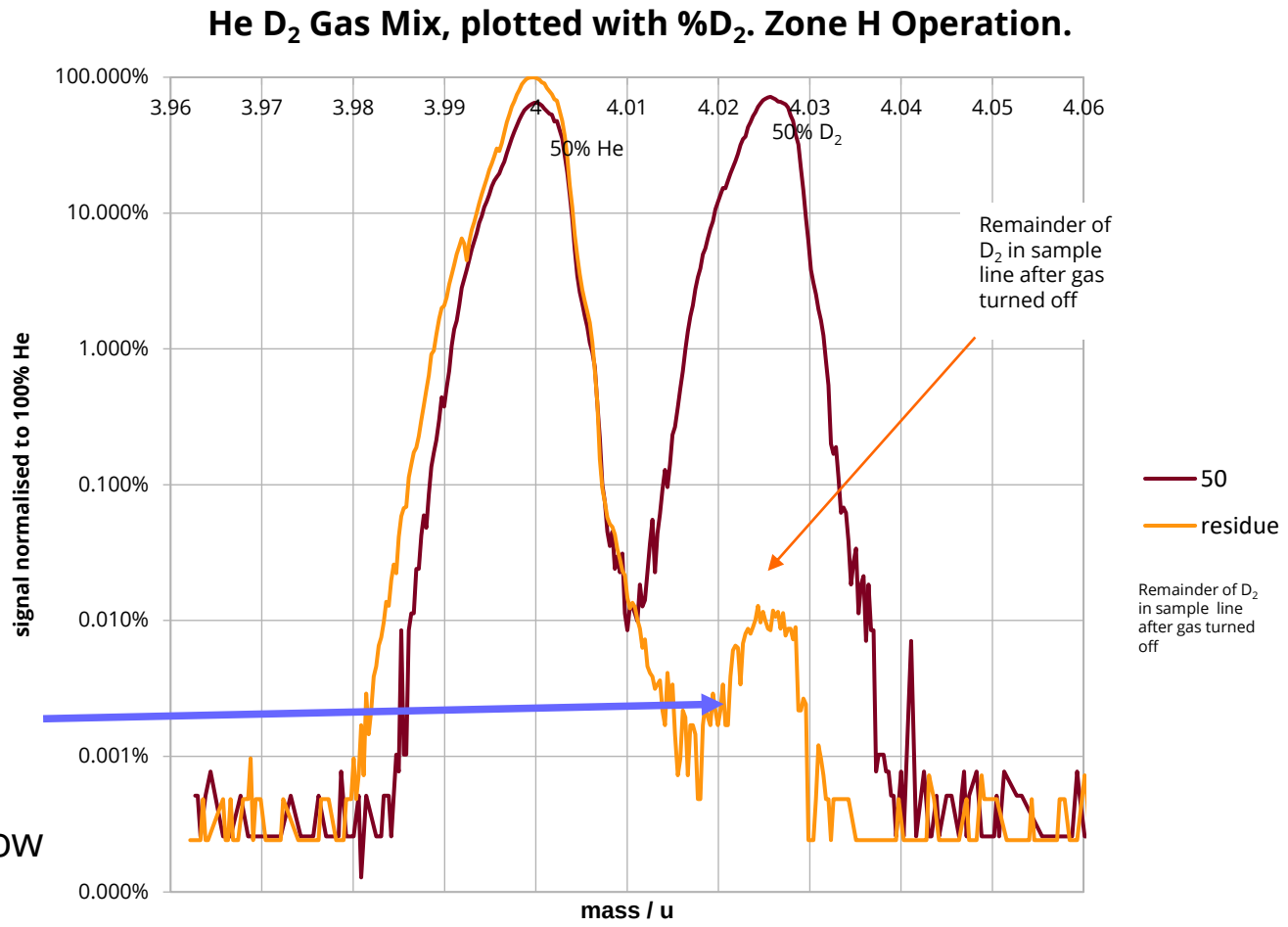


Detection of D_2 in He. Response with varying gas mixes of He and D_2, 50/50, 91/9, 99.5/0.5 and approx 99.99/0.01%

He D_2 Gas Mix, plotted with %D_2. Zone II Operation.

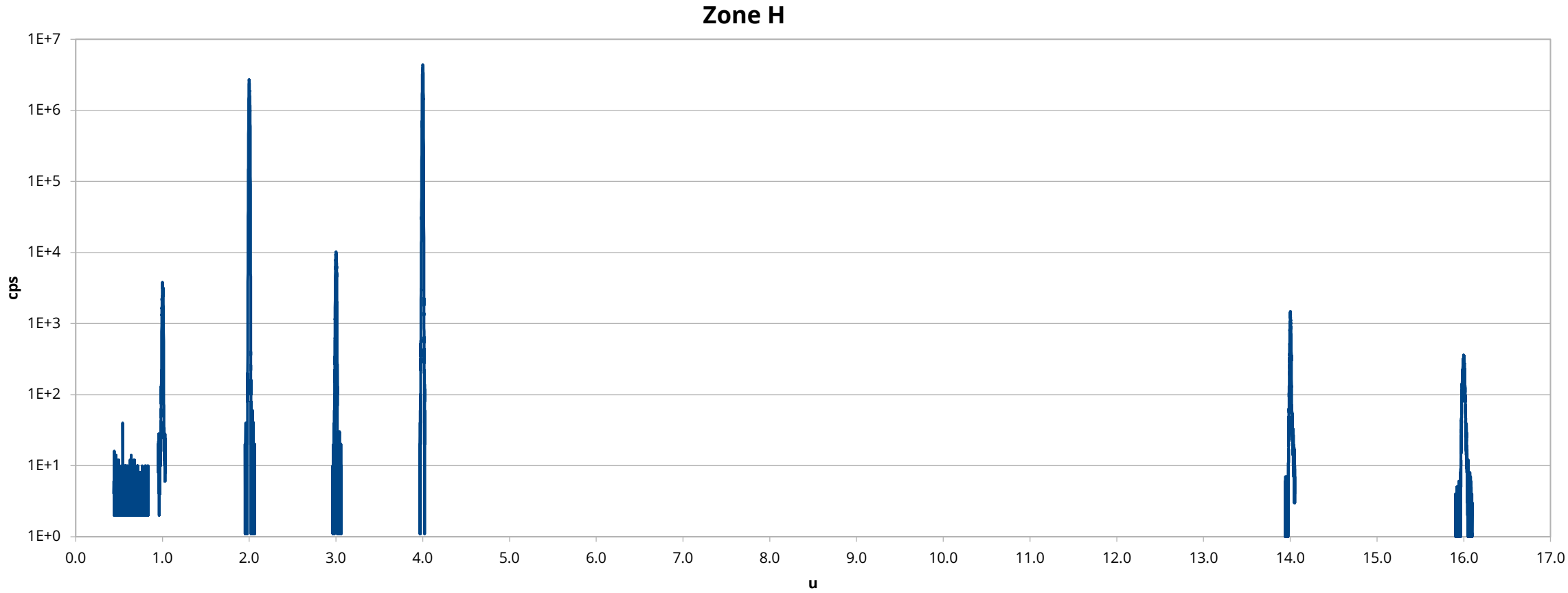


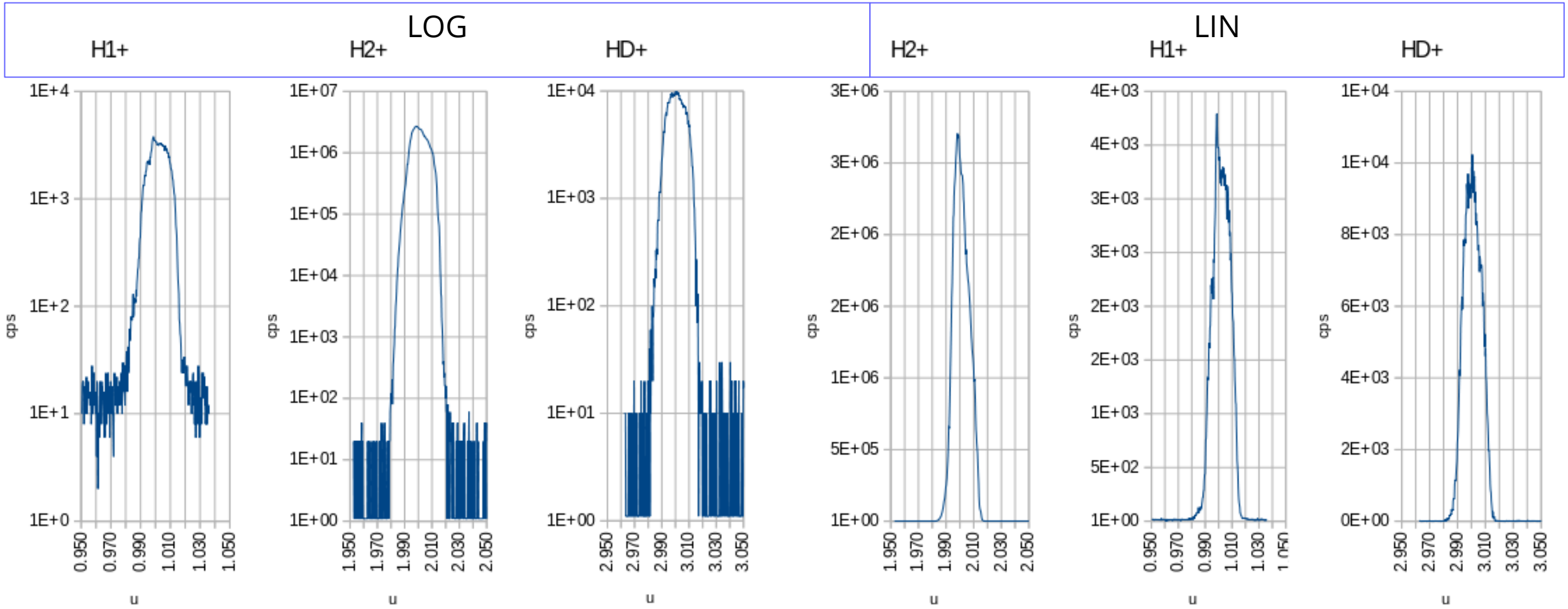




Detection of D_2 in He. Detection limit approaching 10 ppm, which is of the order 99.999% He / 0.001% D_2

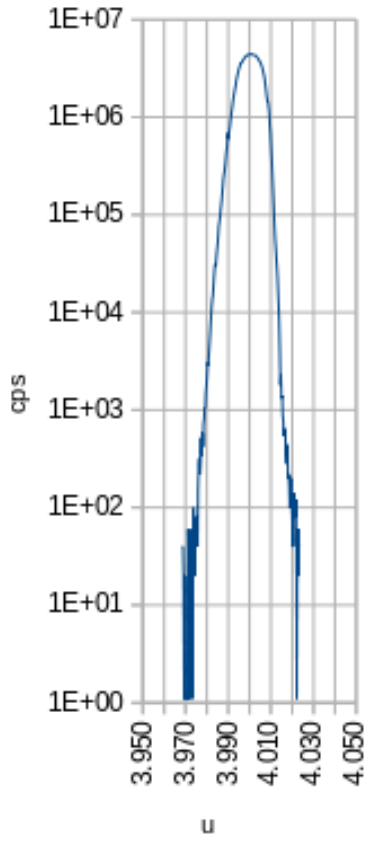
Note that in Zone H detection limit is **not degraded** by the Low Mass Side Tailing Effect encountered in Zone I – this means a better detection limit for He in D_2!


Zone H
1E+7
1E+6
1E+5
1E+4
1E+3
1E+2
1E+1
1E+0
cps
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
13.0
14.0
15.0
16.0
17.0
u

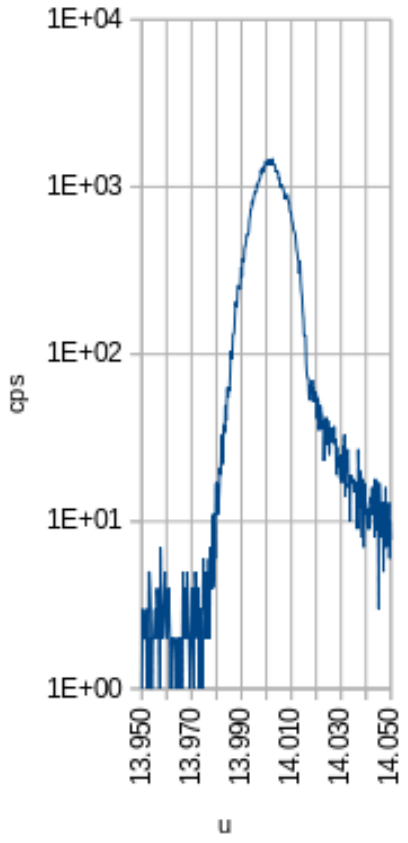

LOG
H1+
H2+
HD+
LIN
H2+
H1+
HD+
cps
u
1E+4
1E+3
1E+2
1E+1
1E+0
1E+07
1E+06
1E+05
1E+04
1E+03
1E+02
1E+01
1E+00
3E+06
2E+06
5E+05
4E+03
5E+02
8E+03
6E+03
0E+00
0.950
0.970
0.990
1.010
1.030
1.050
1.950
1.970
1.990
2.010
2.030
2.050
2.950
2.970
2.990
3.010
3.030
3.050

LOG

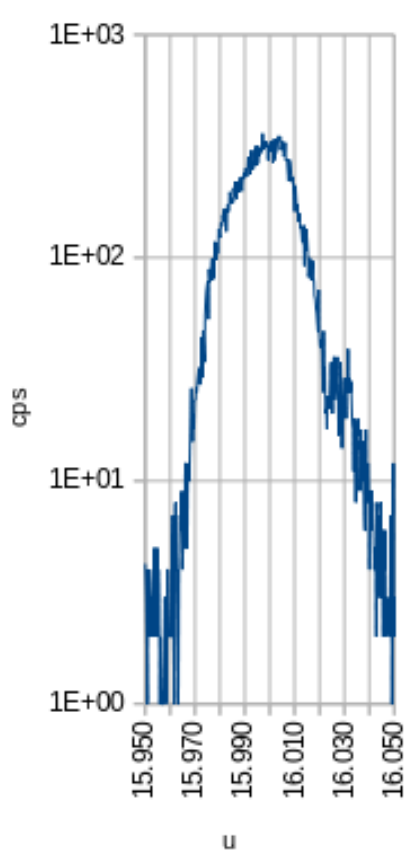
He+



N2++

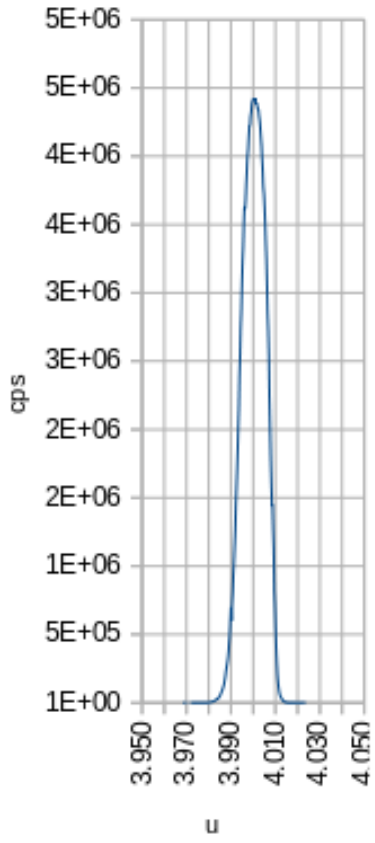


O2++

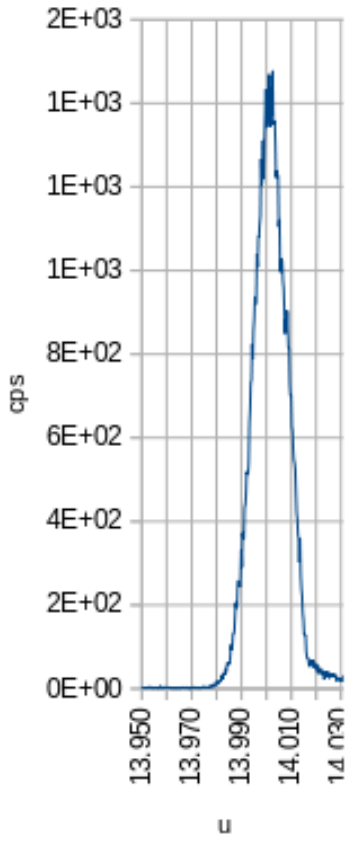


LIN

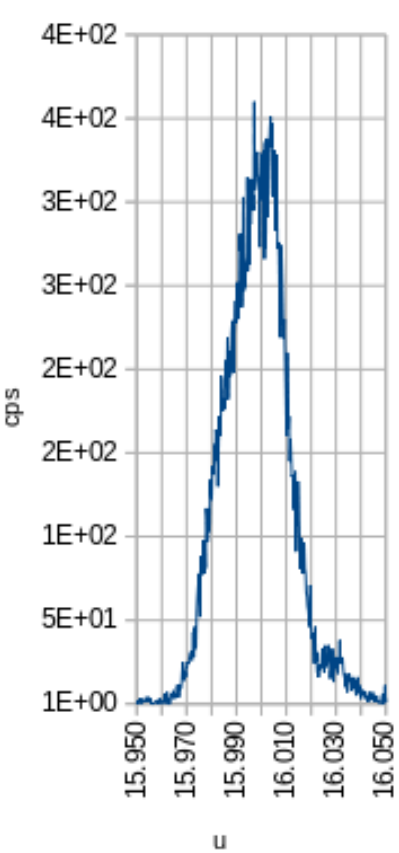
He+

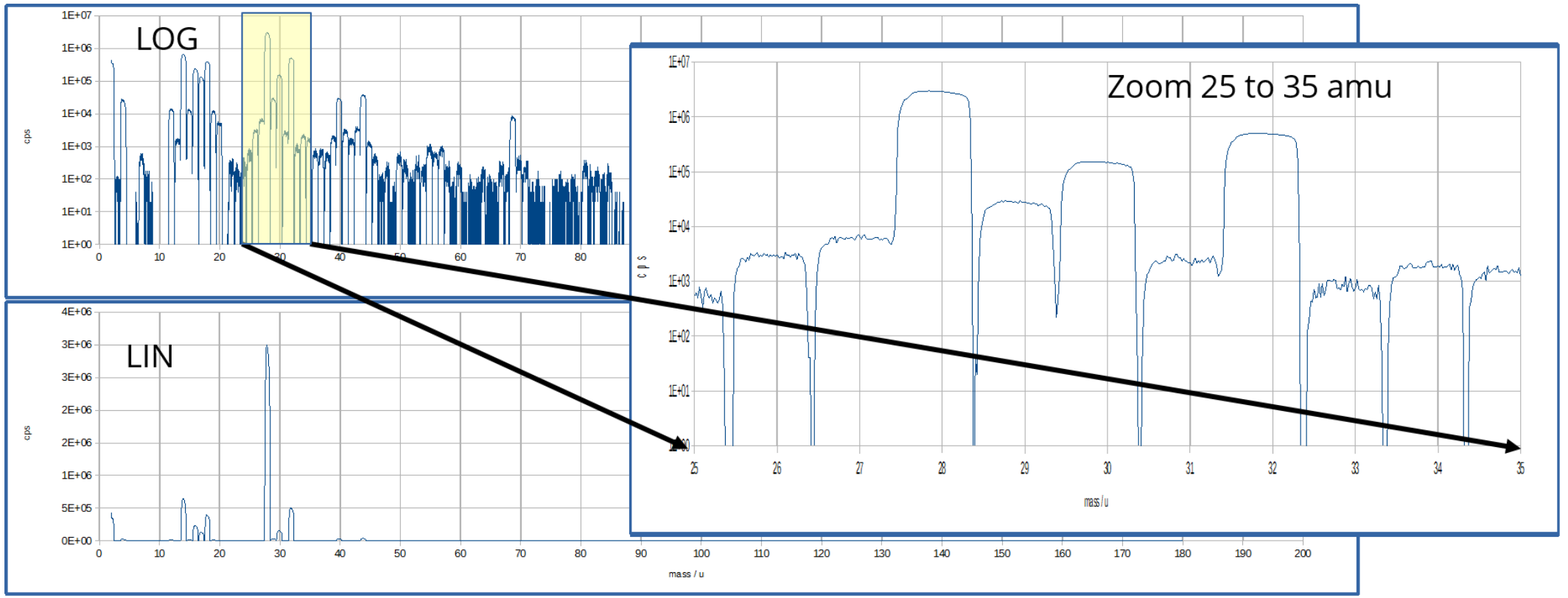


N2++



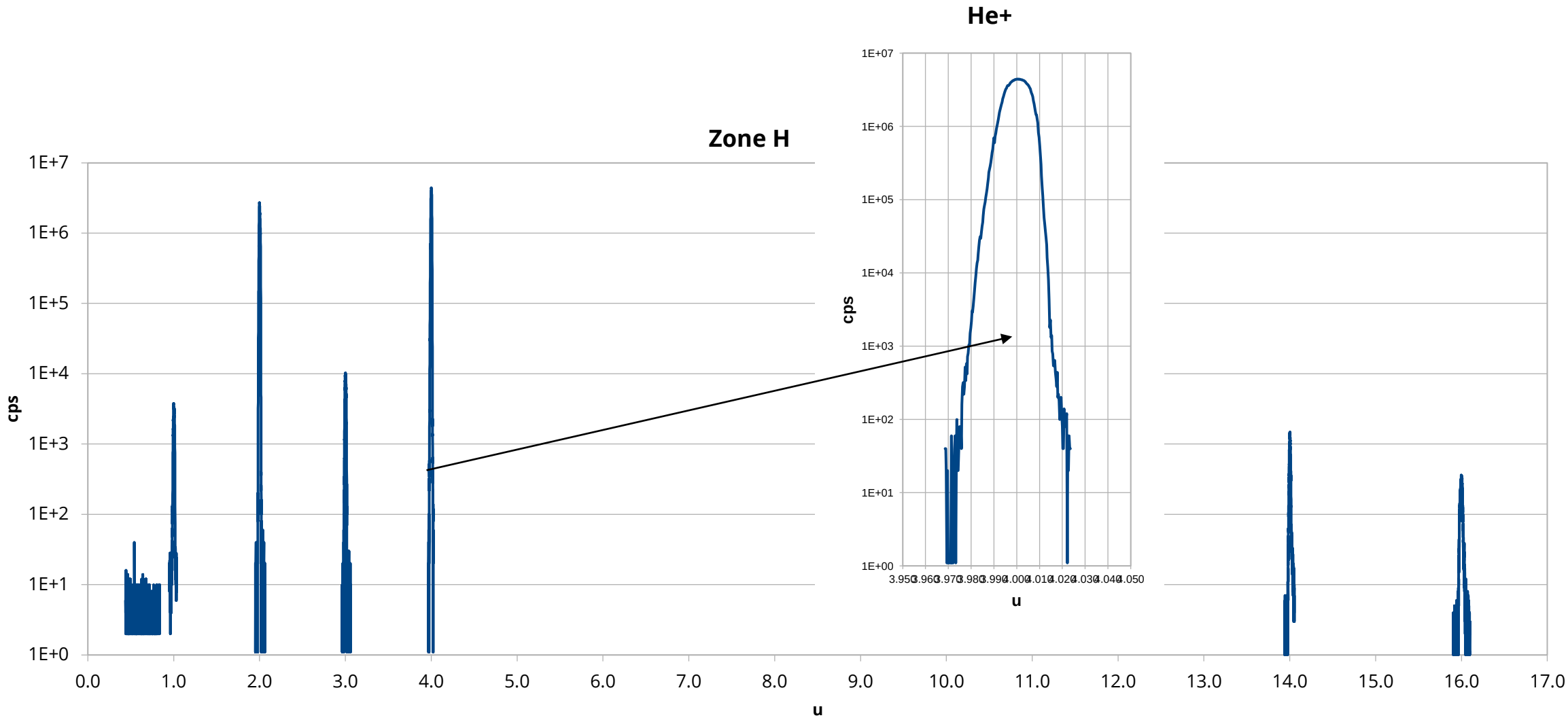
O2++





LOG

LIN


He+
Zone H
cps
u
1E+0
1E+1
1E+2
1E+3
1E+4
1E+5
1E+6
1E+7
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
13.0
14.0
15.0
16.0
17.0
3.950
3.960
3.970
3.980
3.990
4.000
4.010
4.020
4.030
4.040
4.050