# **19. Juni 2024**

Voltage : 1000 500 0 -1750 (Repeller Extractor Lens MCP)

laserpower: 121 mW (actual-10%)

File0 : Residual gasses

File1: Methane (pressure : 9e-7 mBar)

1500 500 0 -1750

File2: Methane ((pressure : 6.92e-7 mBar) laser 5%

File3: Methane ((pressure : 7.1e-7 mBar) laser 10%

250 0 0 -1750

File4: methane ((pressure : 7.3e-7 mBar) laser 1%  = 13.2mW Very poor S/N, no proper output signal

File5: methane ((pressure : 7.3e-7 mBar) laser 2.5%  = 30.7mW poor S/N, marginal output signal

750 0 0 -1750

File6: methane ((pressure : 7.3e-7 mBar) laser 2.5%  = 30.7mW poor S/N, marginal output signal, peak at 5.6 mV)

2000 1000 0 -1750

File7. methane ((pressure : 7.3e-7 mBar) laser 2.5%  = 30.7mW, better S/N; 2 prominent peaks)

File8. methane ((pressure : 7.3e-7 mBar) laser 5%  = 60.7mW, better S/N; 1 extreme peak over 30000 mv, one small peak 6000mV

Under 2000mV range, multiple peaks ranging from 500 to 900mV)

File9. methane ((pressure : 7.2e-7 mBar) laser 4%  = 48.8mW, better S/N; similar profile as previous file. All peaks except the largest are shorter than previous case )

File10. methane ((pressure : 7.2e-7 mBar) laser 1%  = 12.6mW, checking for S7N ratio of 100, no peaks over 6)

File11. methane ((pressure : 6.7e-7 mBar) laser 2%  = 24.8mW, checking for S7N ratio of 100, no peaks over 6)

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File15. methane ((pressure : 6.6e-7 mBar) laser 3%  = 36.8mW, checking for S7N ratio of 100, peaks of 20, 40 and 130 noticed)

File17. methane ((pressure : 6.6e-7 mBar) laser 3.5%  = 42.8mW, checking for S7N ratio of 100,one peak of 1000mV, 2 peaks at 90 each, one at 30)

File18. methane ((pressure : 6.5e-7 mBar) laser 4%  = 48.8mW, checking for S/N ratio of 100,one peak of 4800mV, 400, 170, two peaks of 120 )

2000 500 0 -1750

File21. methane ((pressure : 5.4e-7 mBar) laser 4%  = 48.8mW, checking for S/N ratio of 100, peaks at slightly delayed times, slightly broadened in time compared to previous voltage config)

4000 500 0 -1750

File22: methane ((pressure : 5.2e-7 mBar) laser 4%  = 48.8mW, checking for S/N ratio of 100, TOF reduced significantly due to increase in voltage difference)

500 200 0 -1750

File23: methane ((pressure : 5.0e-7 mBar) laser 4%  = 48.8mW, checking for S/N ratio of 50,

VARIATIONS KEEPING THE REPELLER AT CONSTANT VOLTAGE; 4% power at 500V difference of Extractor

File24: 6000 0 0  (Highest peak at 1.0ish micro-s, pressure 4.7e-7)

File25: 6000 500 0 ()

File26: 6000 1000 0 (slight left shift of the highest peak)

File27: 6000 1500 0 (peal at 0.9ish)

File28: 6000 2000 0 (peak moving leftwards, height increasing)

File29: 6000 2500 0 (peak moving leftwards, height peaking at 16000)

File30: 6000 3000 0 (peak moving leftwards, height of peak decreasing )

**File31: 6000 3500 0 (leftward movement, peak becoming sharper, but shorter 10000)**

File32: 6000 4000 0 (leftward, peak shorter 7000)

File33: 6000 4500 0 (peak stagnant at 0.9009 micro-s, shorter 2000)

File34: 6000 5000 0 (peak stagnant, shorter 1700ish)

File35: 6000 5500 0 (peak stagnant, much higher over 8000)

File36: 6000 6000 0 (peak shifts rightward, higher at 11000ish)

VARIATION OF LENS VOLTAGE KEEPING R; E CONSTANT DIFFERENCE OF 500v, power contant at 4%= 49mW, pressure 6.9e-7)

File37: 6000 3500 500 (moves right peak at 0.9149 micro-s, peak higher at 11500)

File38: 6000 3500 1000 (moves right peak at 0.9269 micro-s, peak height same)

File39: 6000 3500 1500 (moves right peak at 0.9389 micro-s, peak higher at 14000)

Fille40: 6000 3500 2000 (moves right peak at 0.9549 micro-s, peak decreased to 13200)

READING AT VERY HIGH LASER POWER 20%

File41: 6000 3500 0 (moves right peak at 0.9549 micro-s, peak decreased to 13200)

MEASUREMENT OF RESIDUAL GASSES PRIOR TO GAS SWITCH (METHANE TO ARGON)

Laser power 10% (same as previous case before starting with methane) - 121mW

vOLTAGE SETUP 6000 3500 0 0

File42 Laser power 10% 0 121mW: DETECTOR ERROR

File 43 SAME

File 44 SAME

File 45.

File46: Laser 10% (121mW) - peak of 40000 appearing at 0.9389)

ARGON IN CHAMBER (Voltage and Power same)

File 47: Laser 10%

File48: Laser 15% (Splitting noticed at the start and end)

File49: laser 8% (No splitting

# **20. Juni 2024**

* Heliumquelle gestartet (10:00)

Source temp 10.5K

6000 3500 0

PURE HE DROPLETS

File0:  he valve closed, laser at 20% (significantly broad spectrum noticed, several peaks of varying heights)

File1:  he valve opened, laser at 20% (spread out spectrum, even more peaks)

File2:  he valve opened, laser at 5% (spectrum much smaller, one peak persists, number of peaks less,highest peak at 0.5sh)

File3:  he valve opened, laser at 10% (persistence of peak at 0.5, appearance of another very high peak at 1.0ish)

File4: he valve closed, laser 5% (identical spectrum to valve open at 5% case)

DOPING OF XE TO HE DROPLETS

File5: He valve closed

File6: Xe doped helium, .laser at 5% (Xe pressure in pickup chamber : 1.0e-6mBar, no noticed changes, peaks decreased)

File7: Xe doped helium, .laser at 5% (Xe pressure in pickup chamber : 1.0e-5mBar, no strong peak changes, at the smaller level, appearance of a continuous range of peaks, possible appearance of xenon ionization states)

File8: Xe doped helium, .laser at 2% (no appearance of peaks, power not enough for ionization)

File9: Xe doped helium, .laser at 3% (spectral profile similar to Fig2, however, due to low power at high time of iterations, appearance of muted signal at 1.5 ma1050)

File10; Xe pressure changed to 1e-4 mBar, power at 3% (appearance of potential Xe peak at 2ish micro-s, broad structure on closer examination WHY??, appearance of smaller range of peaks after the board Xe peak, small peaks may be related to SNOWBALLS-Xe with a few He attached )

File11: Laser at 2% (complete disappearance of spectrum)

File12: Laser at 2.5% (slow appearance of Xe Peak at 2ish, but less border than the Fig10)

File13: Laser at 2.5%, He valve closed (Xe peak disappeared, highest peak stillö present at 0.5ish)

File14: Laser at 5% (Sharp appearance of Xe peak at 2ish, about half of the peak signal at 0.5ish, resolves into 2 peaks,2 distinct peaks at 2 and 2,05ish, significant no of sharp peaks between 0.45 and 1,35 BOLTZMANN ???)

File15: Laser at 7.5% (Overall profile similar to previous case, appearance of several small peaks between 1.35 to 2, each with decreasing intensity and more Gaussian profile - MIGHT BE RINGING OF THE DETECTOR; but check difference between peaks and correlation with mass difference equal to He, No split in the Xe peak at 2ish, small signal appears at 0.3ish- may be laser start point )

File16: Voltage vs time (Oscilloscope curve)

File17: Laser at 10% (Appearance of sharp peaks again, however potential rigging signal is substantial - ANALYZE FURTHER; Laser start signal is clearly visible at 0.3ish with a sharp peak)

File18: Laser at 3% (Appearance of Xe peak again, peaks understandably lower due to decreased laser power)

CHANGING OF SOURCE TEMPERATURE TO 9.5K

Xe pressure: 1e-4 mBar

File19: Laser at 3% (formation of Xe split peaks at 3% power compared to 5% previously, broader Xe signal, decrease in temp leads to larger He clusters and More Xe accumulation, leading to more signal due to greater ionization cross section, overall Xe signal is much stronger relative to peak)

File20: Laser at 2.5% (formation of sparse split peaks at 2ish for Xe, initial Xe signal quite stong relative to peak, tapers off with more iterations)

CHANGING OF SOURCE TEMPERATURE TO 11.5K

Xe pressure: 1e-4 mBar

File21: Laser at 3% (complete disappearance of Xe signal, overall signal profile much lower than previous temperatures)

File22.Photodiode signal (corroborates the start of oscilloscope at 0.3ish, but need to show this for the paper from the spectra captured)