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# Source & Ion Optics

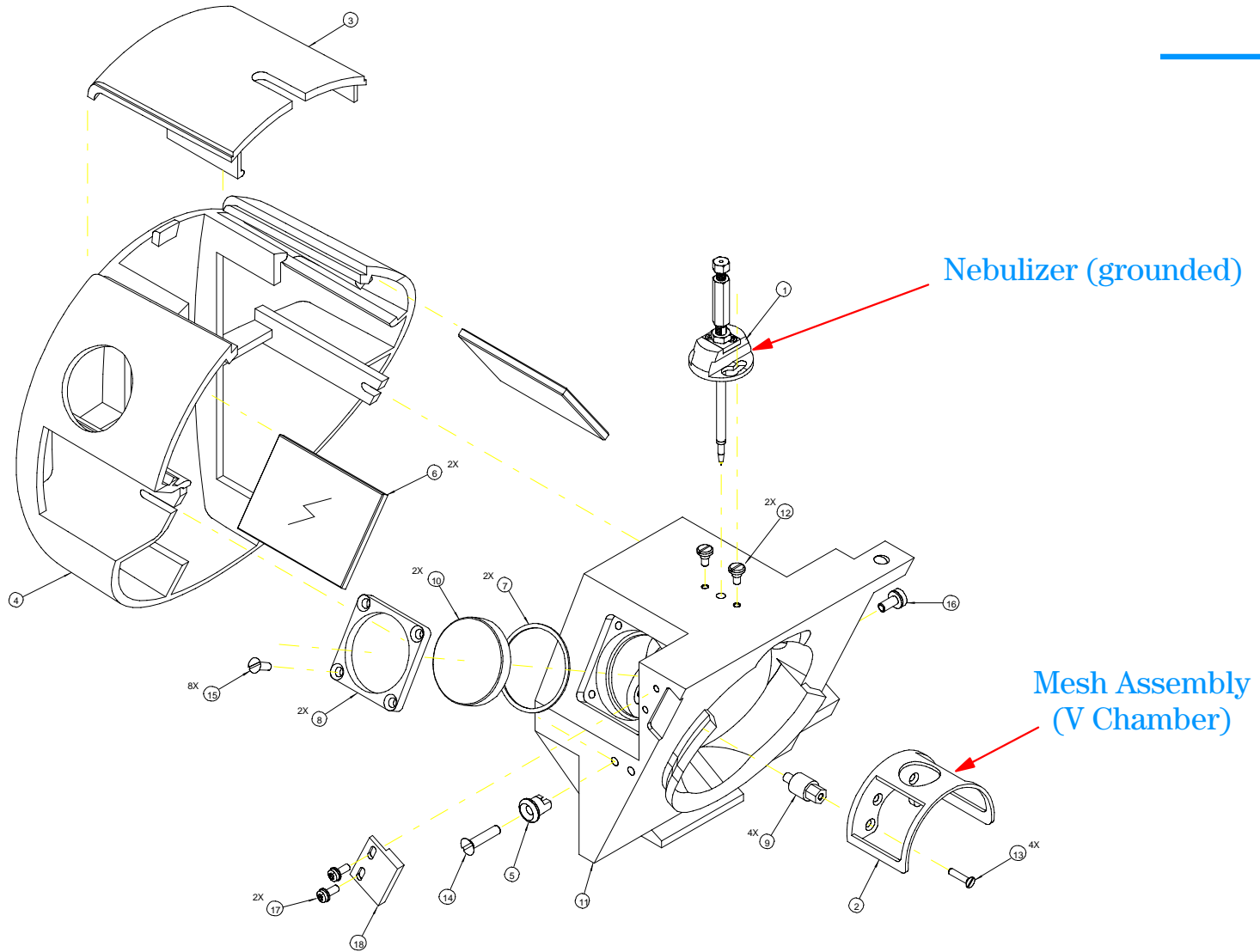
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# Objectives

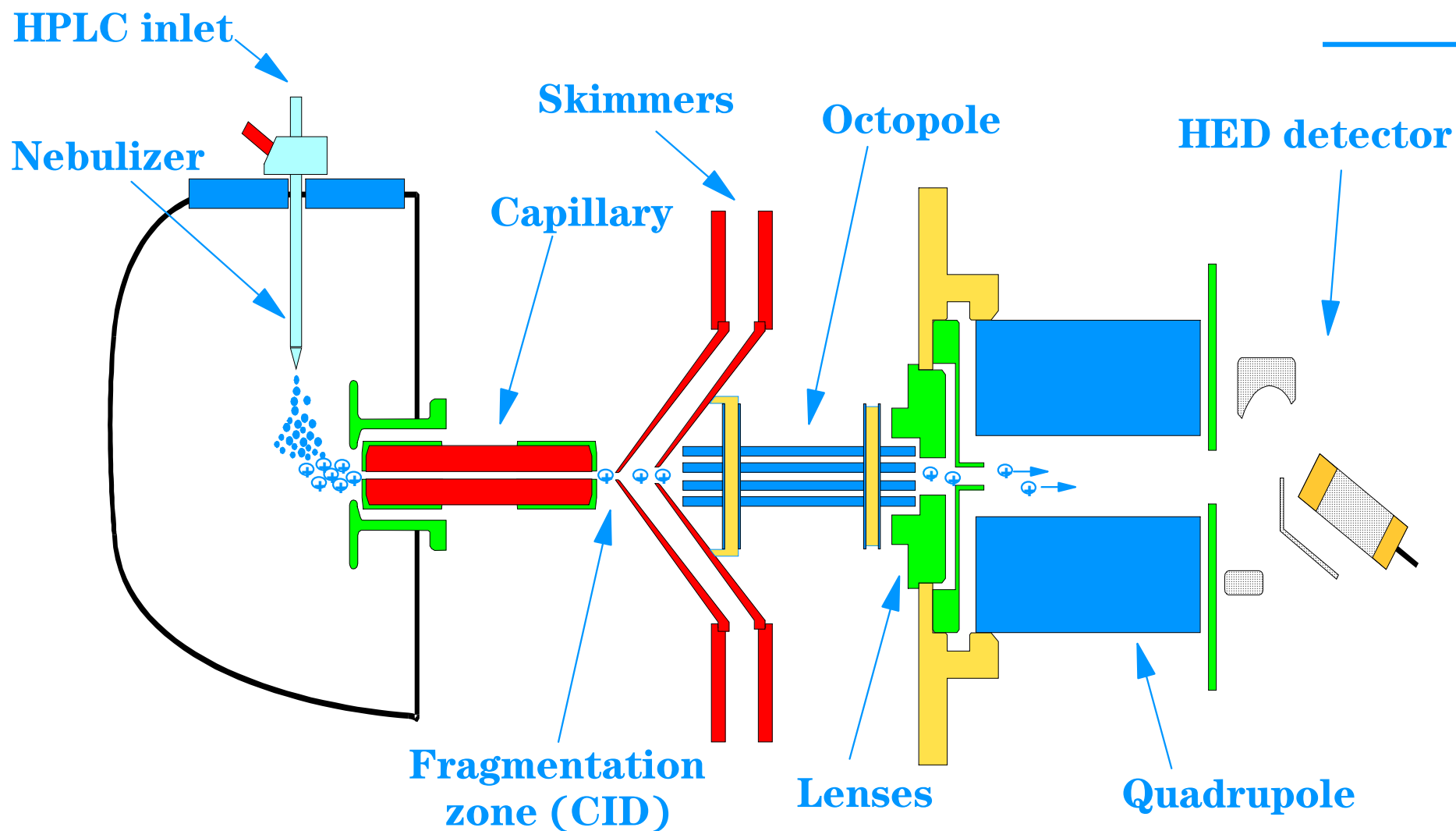
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- Identify components of the API-ES + APCI ion sources
- Describe operation of the ion sources
- Describe the electronic control of the source and ion optics
- Identify test points and readbacks

# API-Electrospray Source



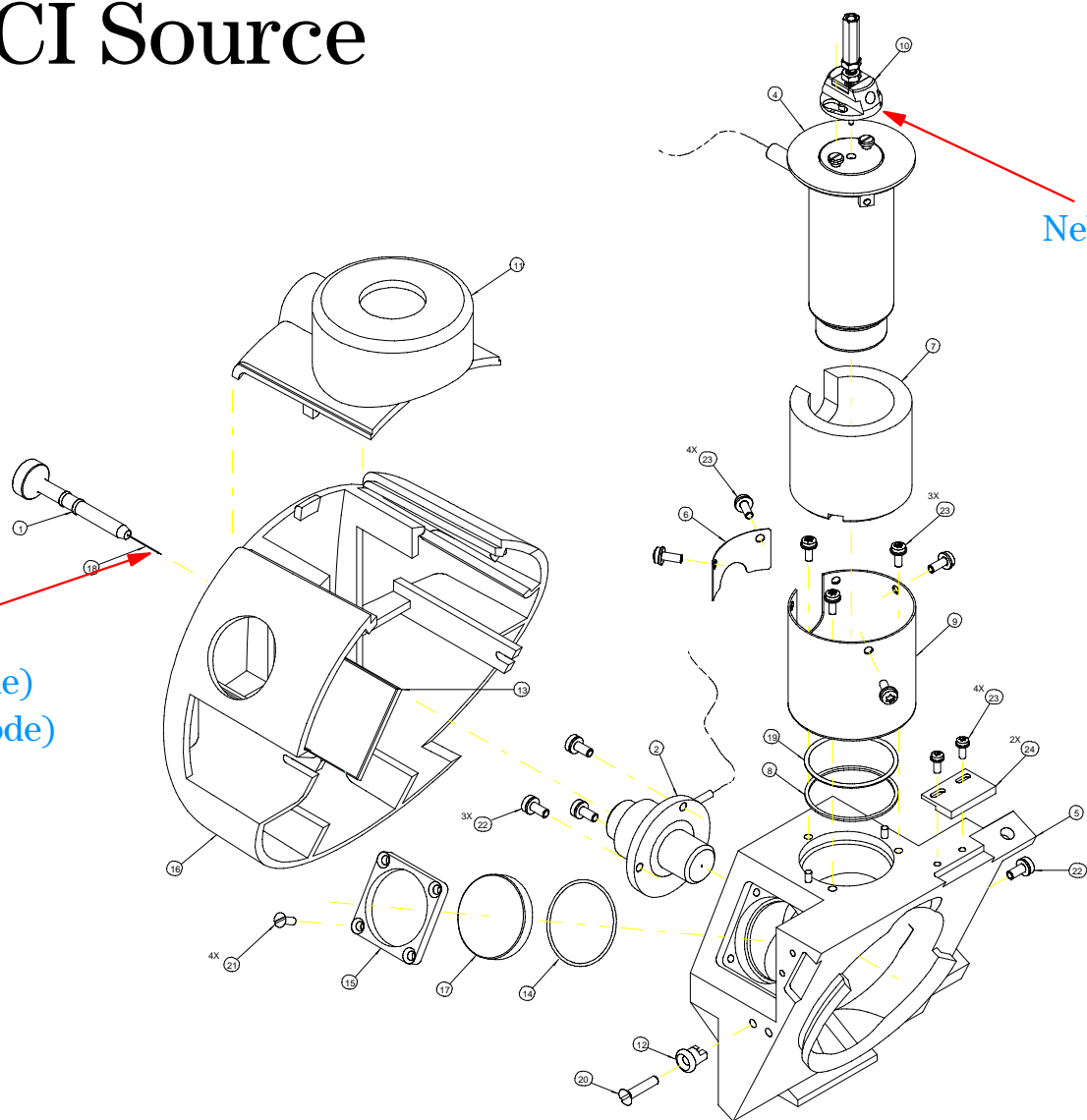
# API-ES Source & Ion Optics



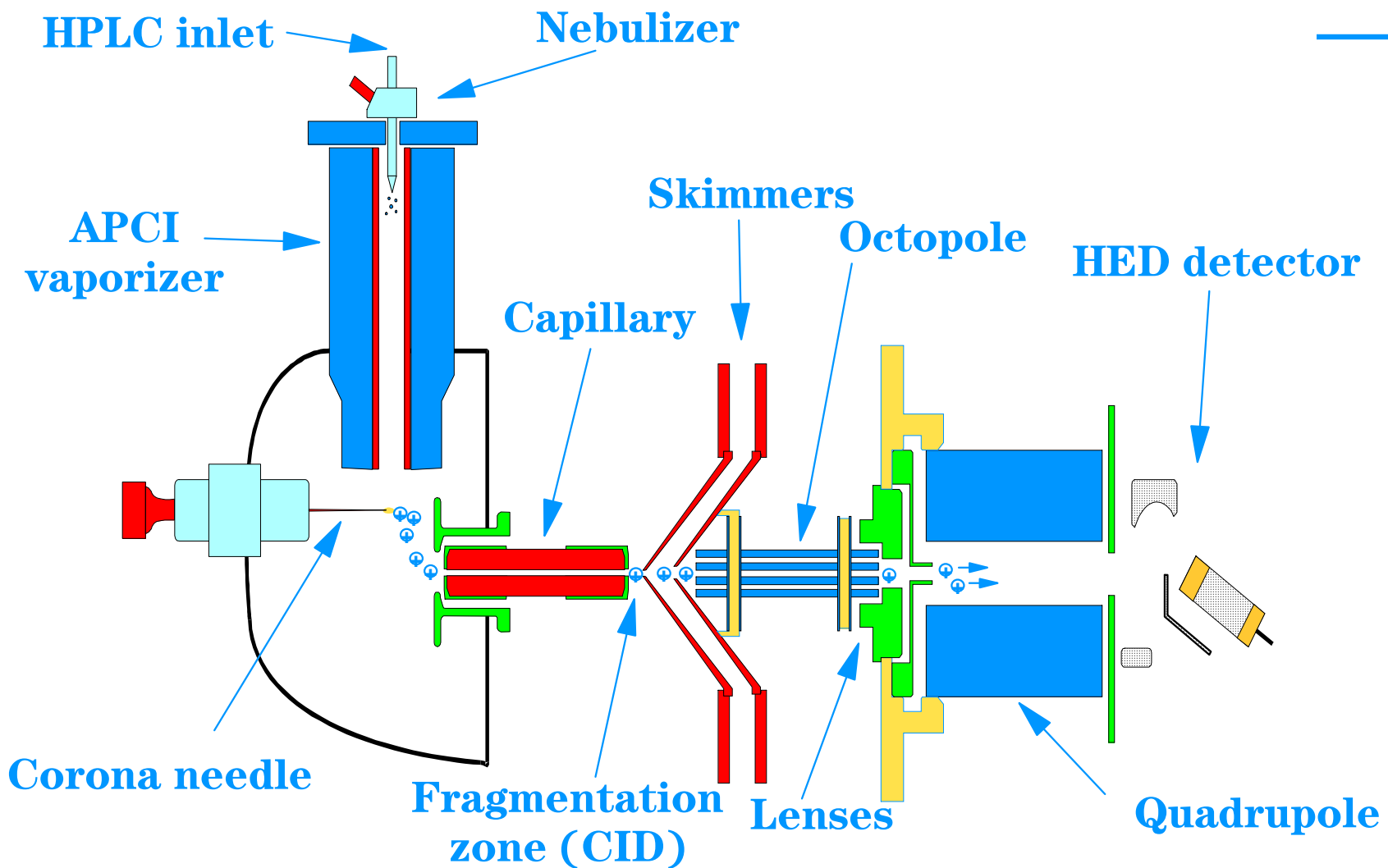
# APCI Source

Corona Needle  
• 0-10uA (Pos. Mode)  
• 0-100uA (Neg. Mode)

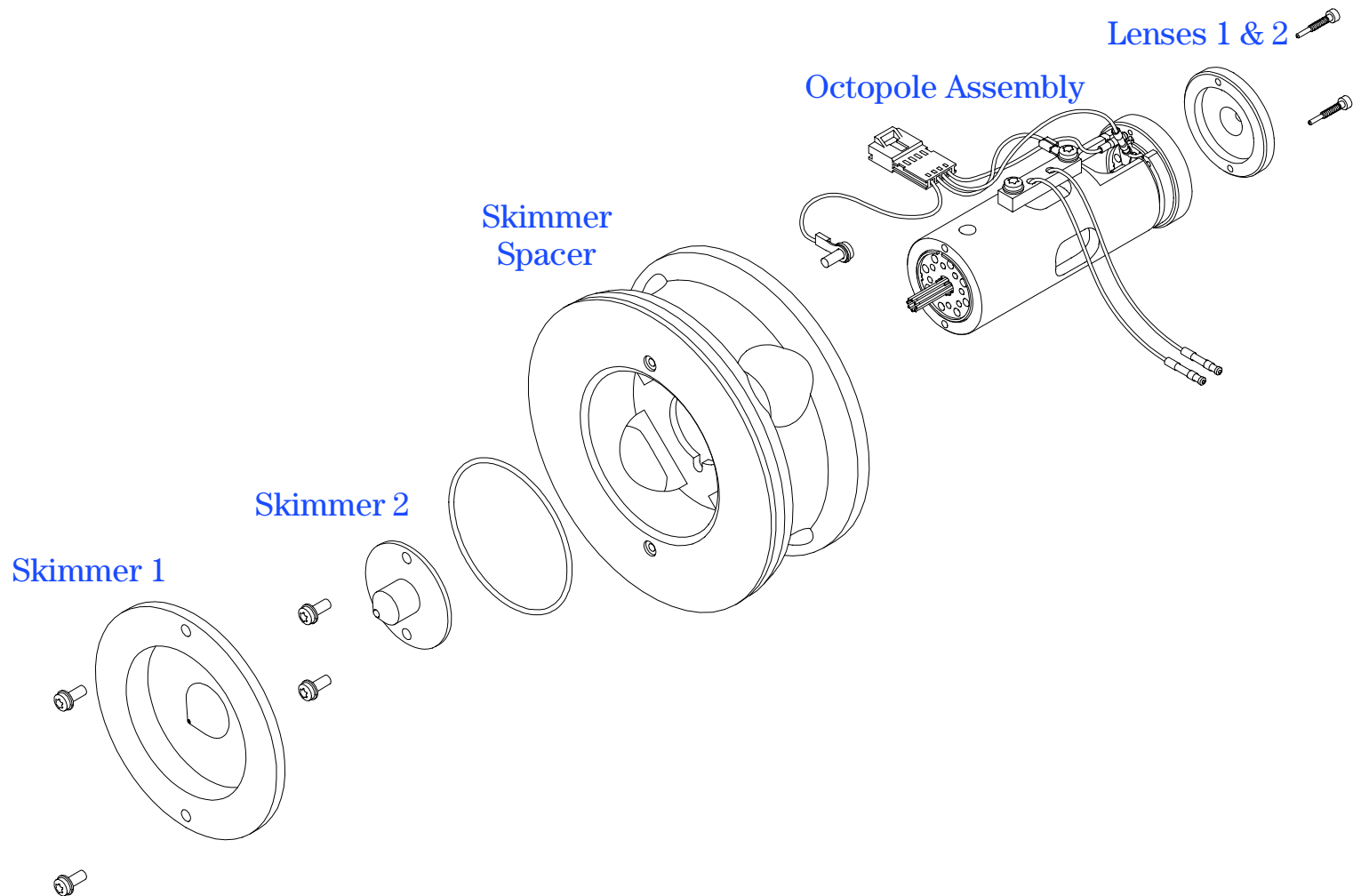
Nebulizer



# APCI Source & Ion Optics



# LC/MSD Ion Optics



# Typical Operating Voltages

Parameter	Command	Range	Typical	Autotune Setpoint	Pos. Mode Polarity	Neg. Mode Polarity
Capillary Voltage	Vcap	0 to 6000 V	4000 V	Fixed	-	+
Corona Current (APCI)	Corona	0 - 10 uA (Pos.) 0 - 100 uA (Neg.)	4 uA (Pos.) 4 uA (Neg.)	Fixed	+	-
CapEx (Fragmentor)	Fragmentor	0 - 400 V	dynamic	Fixed	+	-
Skimmer 1	Skim1	0 - 150 V	dynamic	Y	+	-
Skimmer 2	Skim2	0 - 50 V	8	Y	+	-
Octopole Knee	OpolKnee	0 - 2047 amu	305 - 310 amu	Y	NA	NA
Octopole Peak	OpolPeak	0 - 350 V	300 V	Y	NA	NA
Ion Energy (Octopole)	IonEnergy	0 - 25 V	5 V	Fixed	+	-
Lens 1	Lens1	-20 to +20 V	2	Y	+ or - (spans)	+ or - (spans)
Lens 2	Lens2	0 - 250 V	40	Y	-	+
Iris (Detector)	Iris	0 - 350 V	350 V (Pos.) 0 V (Neg.)	Fixed	-	+



# Readbacks from Source

MSD Spray Chamber

Polarity: Positive Ionization Mode: **API-ES**

Installed Spray Chamber:

Temperatures, Pressure, and Flow

	Setpoint	Maximum	Actual
Drying Gas Flow (l/min):	4.0	13.0	4.0
Nebulizer Pressure (psig):	20	60	20
Drying Gas Temperature (°C):	300	350	300
Vaporizer Temperature (°C):	N/A	N/A	30

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Parameters

Capillary Voltage (V): 4000

Corona Current (µA): N/A

Time Table

Insert Append Cut Copy Paste

OK Cancel Help

MSD Spray Chamber

Polarity: Positive Ionization Mode: **APCI**

Installed Spray Chamber:

Temperatures, Pressure, and Flow

	Setpoint	Maximum	Actual
Drying Gas Flow (l/min):	4.0	13.0	4.0
Nebulizer Pressure (psig):	20	60	20
Drying Gas Temperature (°C):	300	350	300
Vaporizer Temperature (°C):	350	500	32

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Parameters

Capillary Voltage (V): 4000

Corona Current (µA): 4.0

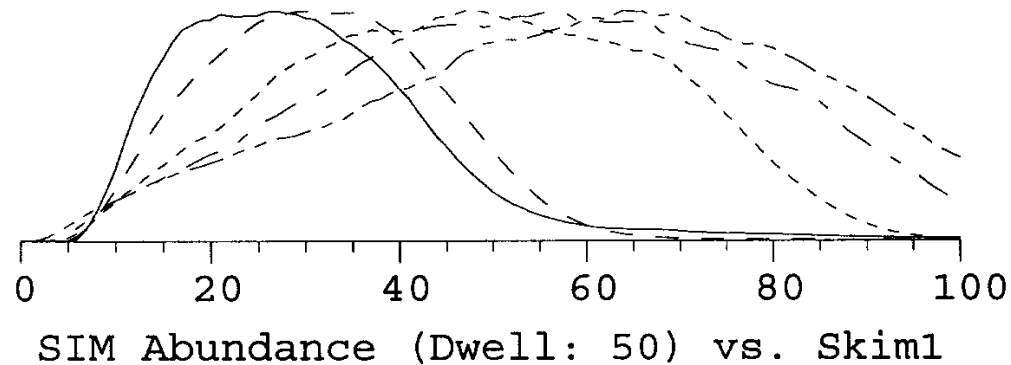
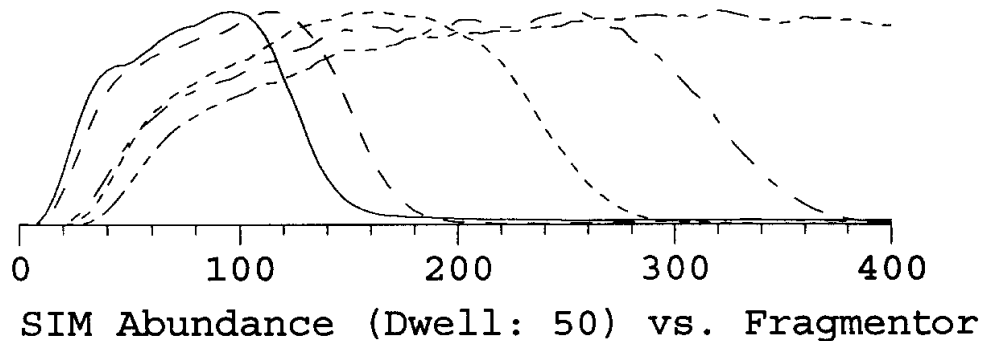
Time Table

Insert Append Cut Copy Paste

OK Cancel Help

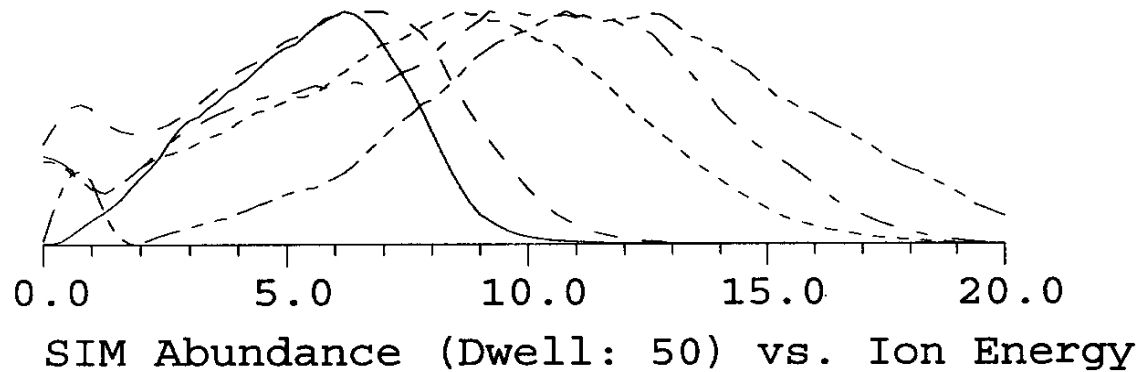
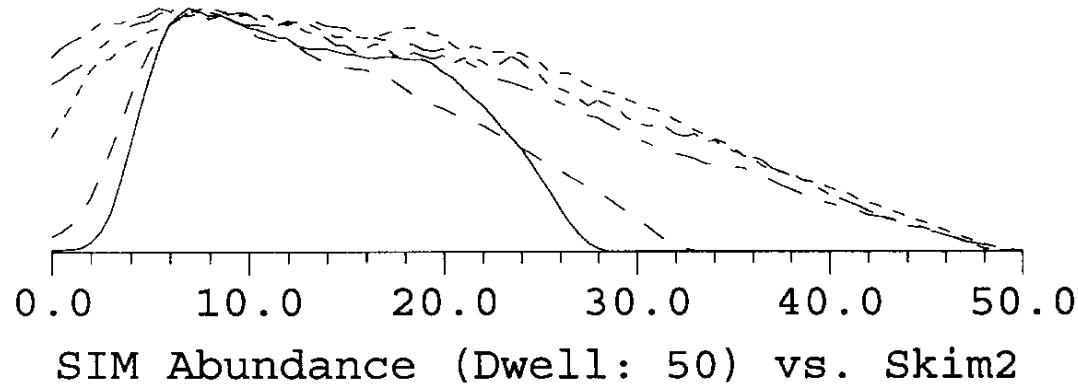
# Lens Ramps, Fragmentor & Skim 1

—— Mass 118.1  
- - - - Mass 322.1  
- - - - Mass 622.0  
- - - - Mass 922.0  
- - - - Mass 1522.0  
- - - - Mass 2121.9



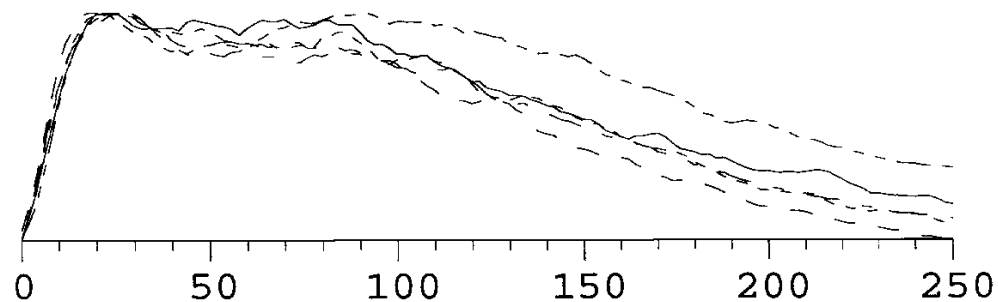
# Lens Ramps, Skim 1 & Skim 2

——— Mass 118.1  
- - - - Mass 322.1  
- - - - Mass 622.0  
- - - - Mass 922.0  
- - - - Mass 1522.0  
- - - - Mass 2121.9

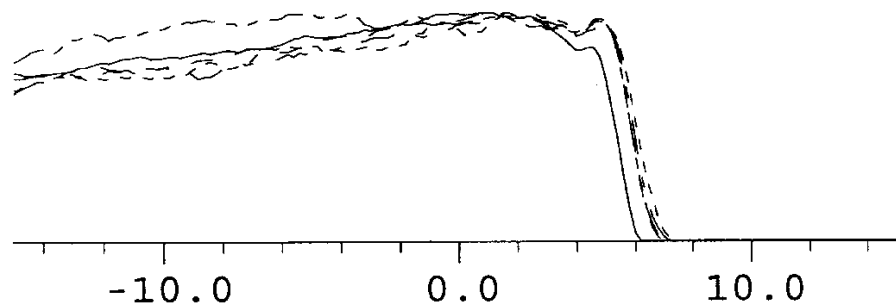


# Lens Ramps, Lens 2 & Lens 1

— Mass 118.1  
- - - Mass 322.1  
- - - - Mass 622.0  
- - - - Mass 922.0  
- - - - Mass 1522.0  
- - - - Mass 2121.9



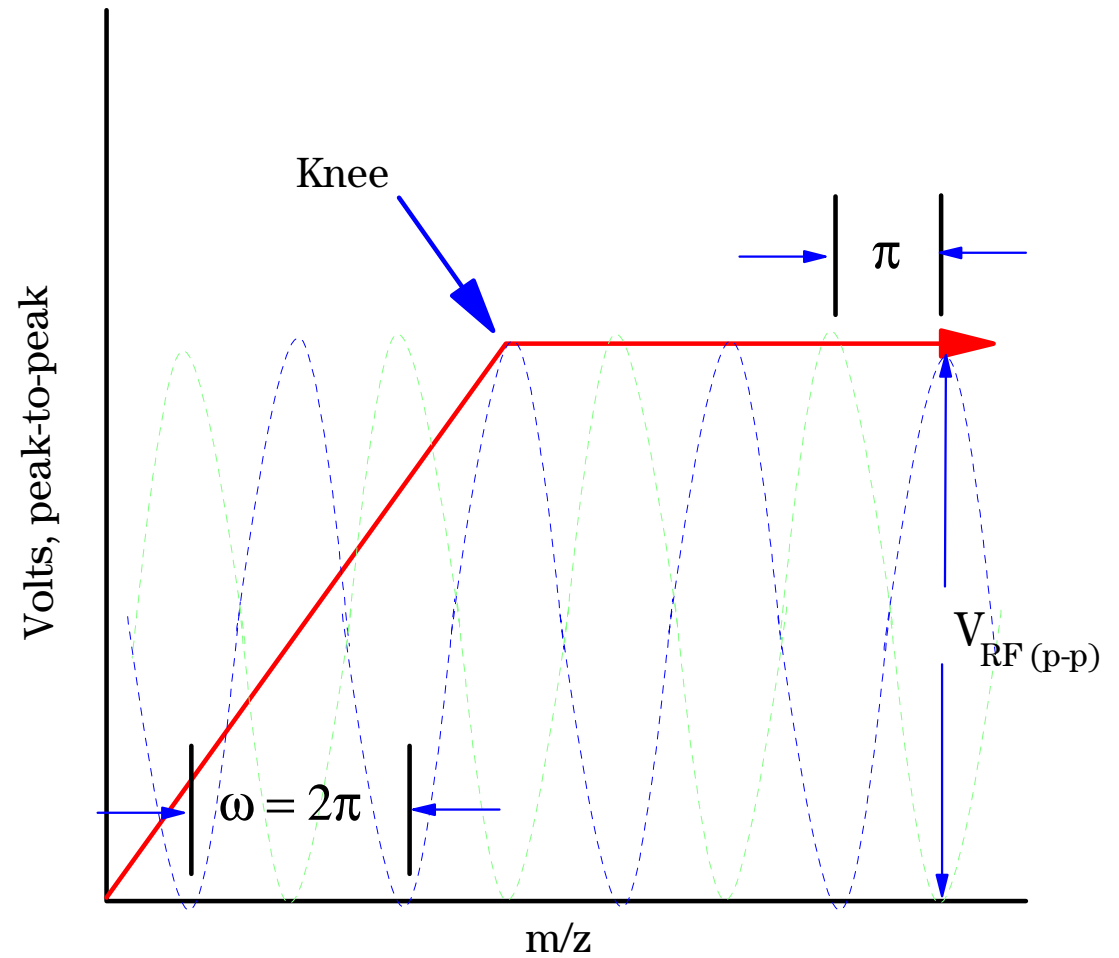
SIM Abundance (Dwell: 50) vs. Lens2



SIM Abundance (Dwell: 50) vs. Lens1

# Octopole Optimization

- The octopole Knee & Peak parameters are set to optimize transmission of low mass (< 300 amu) ions
- The Knee is the inflection point in amu (m/z)
- The Peak is the peak-to-peak RF voltage



## Octopole Board Dipping Procedure

The octopole board (p/n G1946-65009) should be dipped whenever the board or the octopole is replaced. Follow the procedure below to dip the octopole board

1. Connect the leads of a voltmeter between the Drive (positive lead) and ACOM (common lead) test points on the octopole board.
2. In Edit Parameters (Manual Tune), set OpolKnee to 0 & OpolPeak to 150.
3. In Edit Acquisition Parameters, set all tune masses to mass 500 amu.
4. Begin a repeat profile and adjust the slug until a minimum voltage is achieved. Note the minimum voltage below.

Record the voltage with the octopole peak set to 150 V: \_\_\_\_\_Vdc (Should be below 5V)

5. Raise the OpolPeak to 250 and adjust the slug, noting the minimum voltage below

Record the voltage with the octopole peak set to 250 V: \_\_\_\_\_Vdc (Should be below 7V)