

Update 7

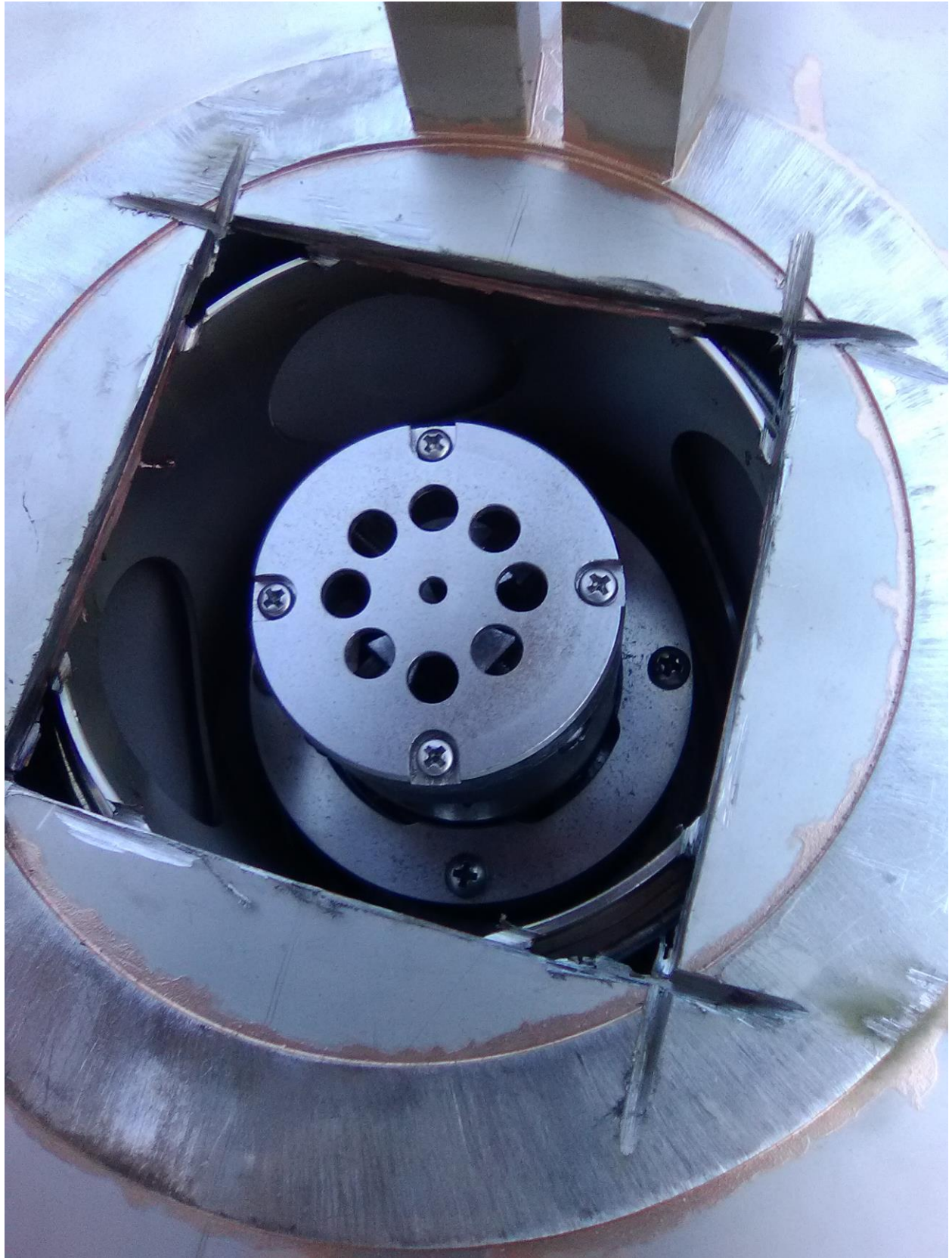
Review the early updates for a chronology of the effort!

Here is a PIX of a good dissociator (top) discharge versus a bad one, taken with a cheap \$8.95 handheld pocket spectroscope and my cell phone camera.



Here are a couple PIX of the bad dissociator and state selector magnets.





The shorted varactor was replaced by a modern SOD882 cased unit, hand soldering it was quite challenging. It was good that I had bought ten of them!

Sweeping the cavity I can now see the frequency change as I vary the varactor voltage. 😊

I have built a vacuum chamber to hold the cavity so I can verify that I can reach the Hydrogen line frequency using the varactor and the cavity temperature in combination.

On the spectrum analyzer you can see the cavity response and the 1420.405752 MHz marker.



In this PIX the cavity is installed into the vacuum chamber but the oven resistors have not been fitted.

The cavity frequency shifts radically if air is inside so I have to pull a good vacuum to eliminate that effect.

Pumping down shows the center frequency rising as the air is evacuated.

The frequency change from air to vacuum was greater than +150kHz.

Unfortunately at vacuum the cavity frequency at zero bias at 15 degrees C is almost 200kHz low!

It should be approximately 800kHz high at 22 degrees C.

Also this first trial varactor has a larger range of frequency adjustment that I'd like.

Since the cavity will run at around 50 degrees C the frequency will drop as the unit heats up. So this current setup will not work.

I'm going to switch to a varactor with a smaller capacitance and also with a larger case. Hopefully the larger case will cause the cavity frequency to rise and the smaller capacitance will reduce the adjustment range.

Then I'll rig heaters to allow me to get to the 50 degree C target temperature.

The cavity has to be tuned to within one Hz for proper operation and the cavity temperature needs to be stable to .001 degrees C!

Typically you adjust the cavity temperature so that the varactor has range to tune to the center frequency with the unit close 50 degrees C.

Once all checks out the cavity will need to be returned to the original vacuum assembly, with all the shields, ovens, and C-field winding restored!

Then I'll need to figure out a way to reattach the RF end and dissociator end in a way that can be opened and closed if needed. The original fitting was all welded construction. Need to think a bit on that.

Cheers! Corby