Insights into Spectra-Physics' InSight DeepSee

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Overview

We thought the Nikon A1R MP's laser system, the Spectra-Physics InSight DeepSee, was in need of repair. After contacting the service engineer for Spectra-Physics, we learned two laser diodes were already replaced with a bill of $30k. We were also warned that the laser power had been reduced, but otherwise the DeepSee should be functional.

- The liquid in the chiller unit has been flushed and replaced with coolant.
- After turning on the microscope and laser systems, it took several days for the laser's humidity to reach acceptable levels
- The power output has been reduced

```
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
```

How long does the InSight DeepSee need to effectively warm up?

Sept 20: Turned on all scope components and noticed humidity was too high, so I started logging it

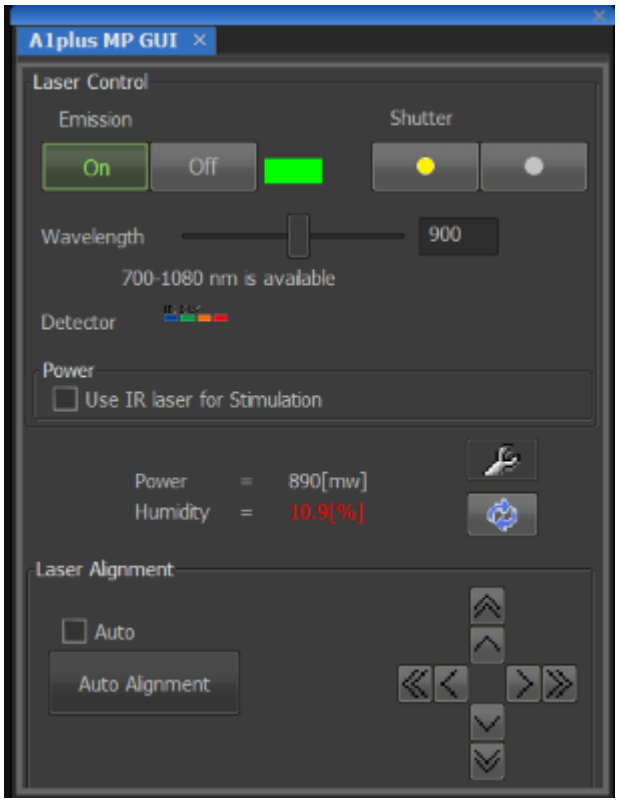


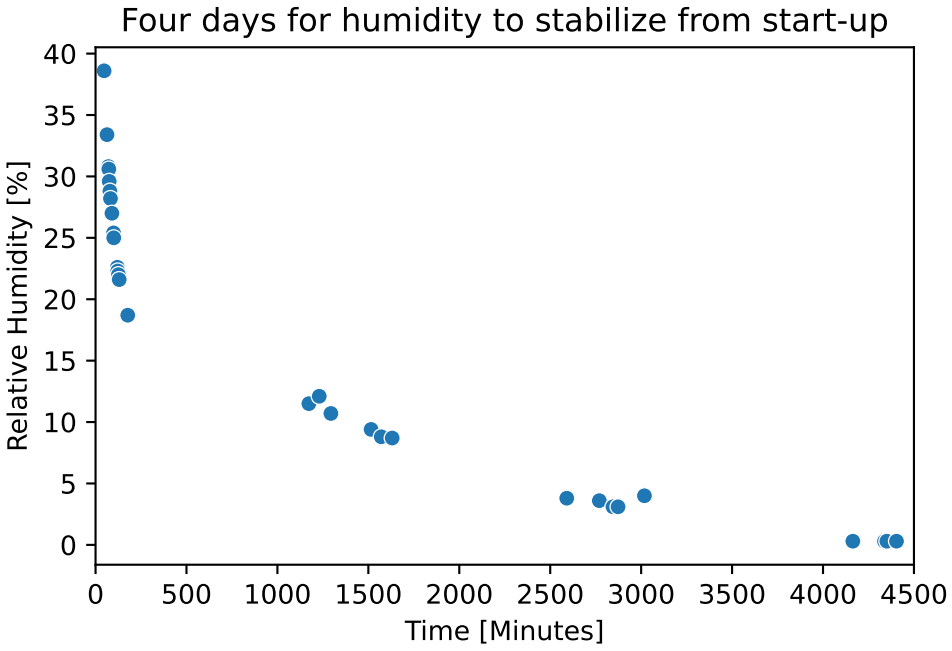
Figure 1: Image of A1plus MP GUI

```
humidity_csv = "Time_since_DeepSee_turn_on.csv"
humidity_df = pd.read_csv(humidity_csv)

humidity_plot = sns.scatterplot(data = humidity_df,
                                x = "Time [Minutes]",
                                y = "Relative Humidity [%]",
                               )

humidity_plot.set_title("Four days for humidity to stabilize from start-up")
humidity_plot.set_xlim(0, 4500)
```

```
(0.0, 4500.0)
```



How much power did we lose as a function of wavelength?

- Digitized the theoretical tuning power from the manual
- There also appears to be a warmup time after turning emission ON
- Severe drop in power when laser is tuned above 1000nm

```
data_csv = "2022-09-23_laser-power-vs-wavelength_with-theoretical.csv"
df = pd.read_csv(data_csv)

palette = sns.color_palette("mako_r", 5)
```

```
sns.set_theme(style="whitegrid")

g = sns.scatterplot(data = df,
                    x = "Wavelength [nm]",
                    y = "Power [mW]",
                    hue = "Replicate",
                    style = "Replicate",
                    palette = palette,
                   )

g.set_title("InSight DeepSee far from spec \nat $\lambda$ > 1000nm")
g.set_xlim(700, 1100)
g.set_ylim(-20, 1400)
```

```
(-20.0, 1400.0)
```