

Vacuum Structure Testing

Need to install

- Anaconda
- Ni visa
- Ni 488.2

Hardware you will need:

- 1 Calibration Pod (Keysight)
- 1 SMA barrel
- 2 SMA cables (provided for)
- 1 NWA instrument (provided for)
- Your PC or Mac

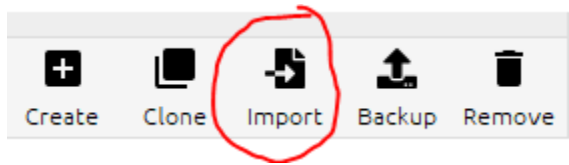
Download Testing Script from Github: <https://github.com/slaclab/bpm-python-scripts>

Setting up Environments:

- Download and Install [Ni VISA](#)
- Download and Install [Ni 488.2](#)
- Download [Anaconda](#)

Anaconda Environment Setup:

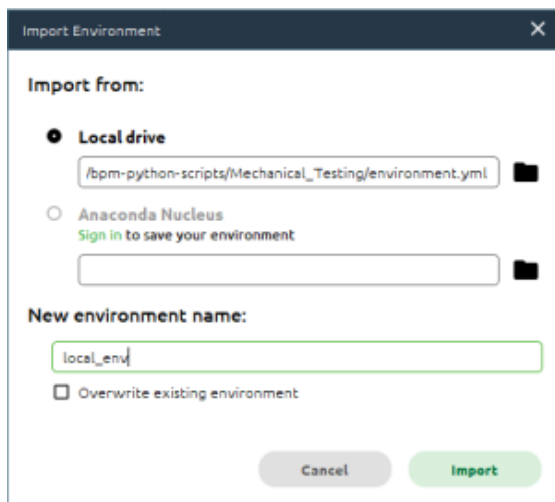
Open Anaconda, and select import environment:



Navigate to the location for the bpm-python-scripts, and upload the environment.yml file:

- ~\bpm-python-scripts\Mechanical_Testing\environment.yml

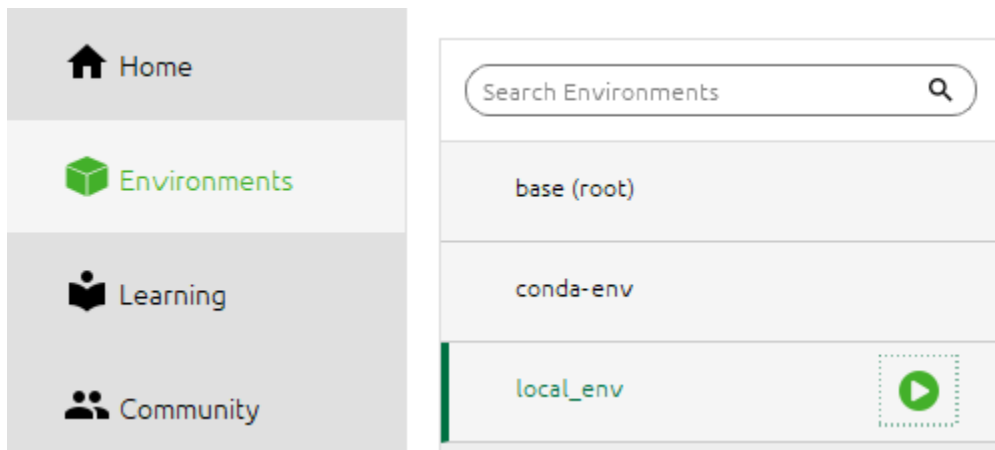
Create an environment and give it an instance name (i.e. local_env)



Click import. Environment setup is complete.

Run environment in terminal

In the anaconda environment list, click on the play button and select "Open Terminal"



Navigate to folder, and run program (Windows 10):

```
C:\Windows\system32\cmd.exe

(local_env) C:\Users\fengrui>
```

Navigate to the folder where you downloaded the test script named main.py:

```
C:\Windows\system32\cmd.exe

09/28/2022 02:39 PM          204 environment.yml
09/27/2022 01:16 PM       10,500 main.py
06/28/2022 11:44 AM        7,078 NetworkAnalyzer.py
06/28/2022 02:47 PM       81,761 pcmm_workbook.ipynb
08/31/2023 03:03 PM          <DIR>      plots
10/07/2022 01:39 PM       18,574 rawdata10_7.PNG
08/31/2023 03:03 PM        1,947 Results_List.csv
09/27/2022 03:04 PM       15,775 TestEnv.py
09/28/2022 03:37 PM          <DIR>      __pycache__
                21 File(s)       178,869 bytes
                5 Dir(s)  778,382,766,080 bytes free

(local_env) C:\Users\fengrui\OneDrive - SLAC National Accelerator Laboratory\Documents\BPMs\PythonProject\bpm-python-scripts\Mechanical_Testing>
```

Run the Test Procedures (Preparation):

- Establish connection to the back of the network analyzer from PC with USB cable
- Connect 2 foot RF cables to Port 1 and Port 2 of the Network Analyzer
- Run the test script by typing:
 - python3 main.py
- A command-line program will show up:

```
C:\Windows\system32\cmd.exe - python3 main.py

(local_env) C:\Users\fengrui\OneDrive - SLAC National Accelerator Laboratory\Documents\BPMs\PythonProject\bpm-python-scripts\Mechanical_Testing>python3 main.py
Welcome to SLAC BPM characterization program
Default instrument address: GPIB0::16::INSTR
Please enter BPM serial number:
--> ###
```

- Enter the BPM number (i.e. 340)

```
C:\Windows\system32\cmd.exe - python3 main.py

(local_env) C:\Users\fengrui\OneDrive - SLAC National Accelerator Laboratory\Documents\BPMs\PythonProject\bpm-python-scripts\Mechanical_Testing>python3 main.py
Welcome to SLAC BPM characterization program
Default instrument address: GPIB0::16::INSTR
Please enter BPM serial number:
---> 340
Please enter BPM PCMM in mm (1/4 of the BPM inner diameter):
--->
```

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- Enter the PCMM in mm (i.e. 5.325)

```
C:\Windows\system32\cmd.exe - python3 main.py

(local_env) C:\Users\fengrui\OneDrive - SLAC National Accelerator Laboratory\Documents\BPMs\PythonProject\bpm-python-scripts\Mechanical_Testing>python3 main.py
Welcome to SLAC BPM characterization program
Default instrument address: GPIB0::16::INSTR
Please enter BPM serial number:
---> 340
Please enter BPM PCMM in mm (1/4 of the BPM inner diameter):
---> 5.325
Job Number:
--->
```

-
- Enter job number

```
C:\Windows\system32\cmd.exe - python3 main.py

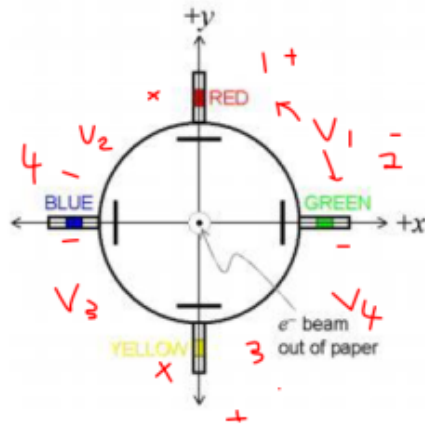
(local_env) C:\Users\fengrui\OneDrive - SLAC National Accelerator Laboratory\Documents\BPMs\PythonProject\bpm-python-scripts\Mechanical_Testing>python3 main.py
Welcome to SLAC BPM characterization program
Default instrument address: GPIB0::16::INSTR
Please enter BPM serial number:
---> 340
Please enter BPM PCMM in mm (1/4 of the BPM inner diameter):
---> 5.325
Job Number:
---> 1
What is the BPM's processing freq? (In MHZ):
--->
```

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- Enter BPM frequency (i.e. 300, 230)

Run through calibration (initial), and test the BPM

- Upon entering the BPM frequency, the command prompt listing options will pop up containing the following options:
 - **Select one of the Following:**
 - Press 0 For Single Sweep
 - Press 1 For Full Test
 - Press 2 For Calibration
 - Press 4 For Network Analyzer Status:
 - Press 5 to Quit, or Test Another BPM
- If this is the initial run for the script (applies to every restart), you **MUST** calibrate the instrument before running full test, therefore, **input "2" and press enter**
- Follow through the calibration procedure according to the prompts
 - Note: for through measurement, be sure to use a SMA barrel to connect two cables instead of using one
 - Note: please use the calibration pod
- After calibration is completed, run a full test, follow the instructions from the prompt
 - The BPM port numbering is described below:

PCMM measurements:



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- Run through the BPM test script and interchange connections based on prompt in the script, this may take 20-30 minutes in total to run through the test
 - Note: Be sure to save the test result by typing "Y" or "y" according to prompt, otherwise, your data would be lost!
- PCMM test is then complete, to confirm the test, navigate to the script folder and locate the added files that are there:
 - File 1: txt test result in the name of BPM-###-#-cal-DDMMYYYY-HH-MM-SS.txt
 - File 2: in the plots folder a new image in the name of BPM-###-#-cal-DDMMYYYY-HH-MM-SS.png
- If you wish to test another BPM, follow through the script again without having to run through the calibration procedure