

Introduction

Overview of the chip

Pulsed Light Calibration

CW Light Calibration

Method Evaluation

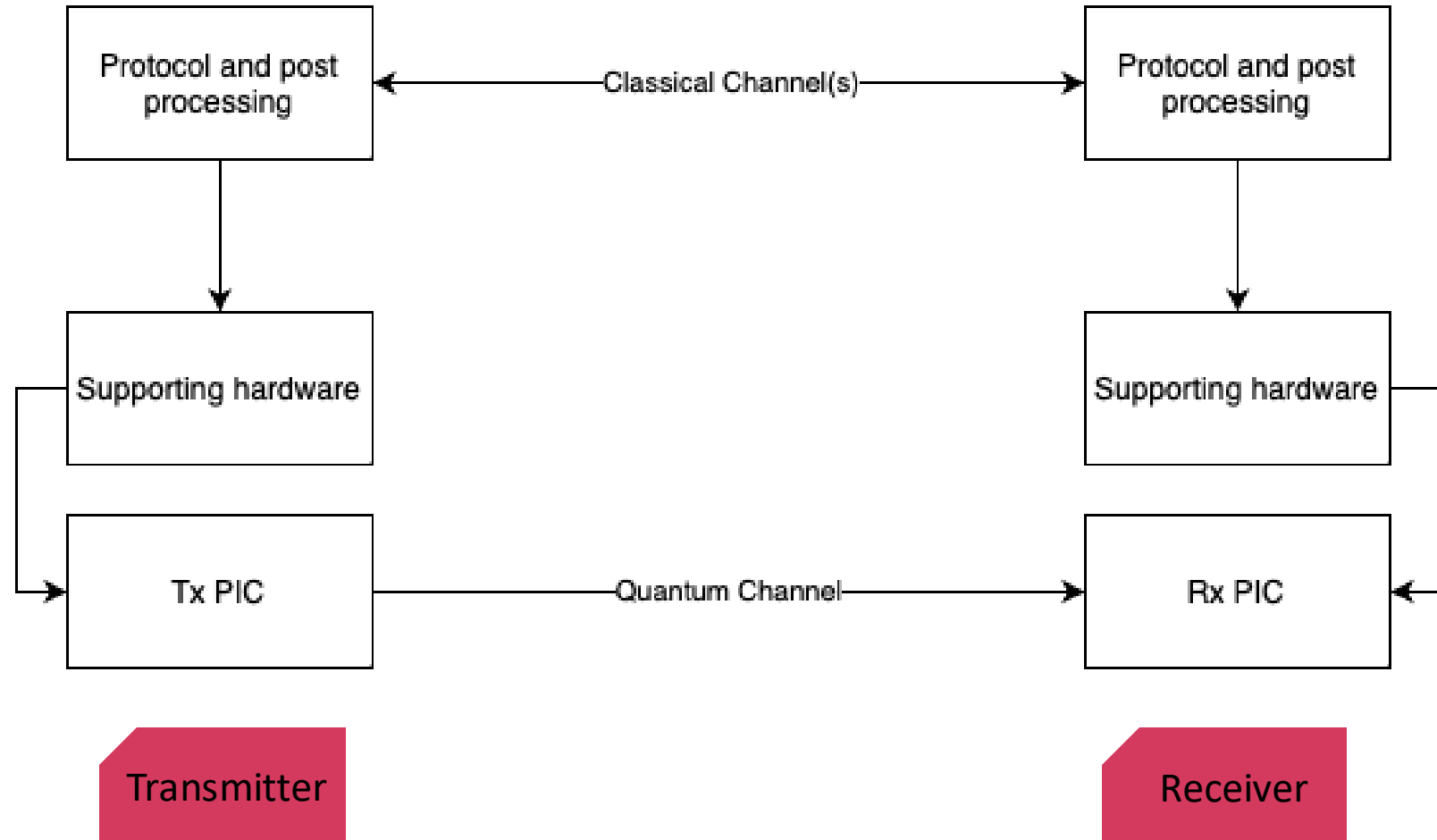
Testing

Code



Rx PIC Calibration Project
William Caiger

Where does the Rx Chip come in to the QKD system?



Introduction

Overview of the Chip

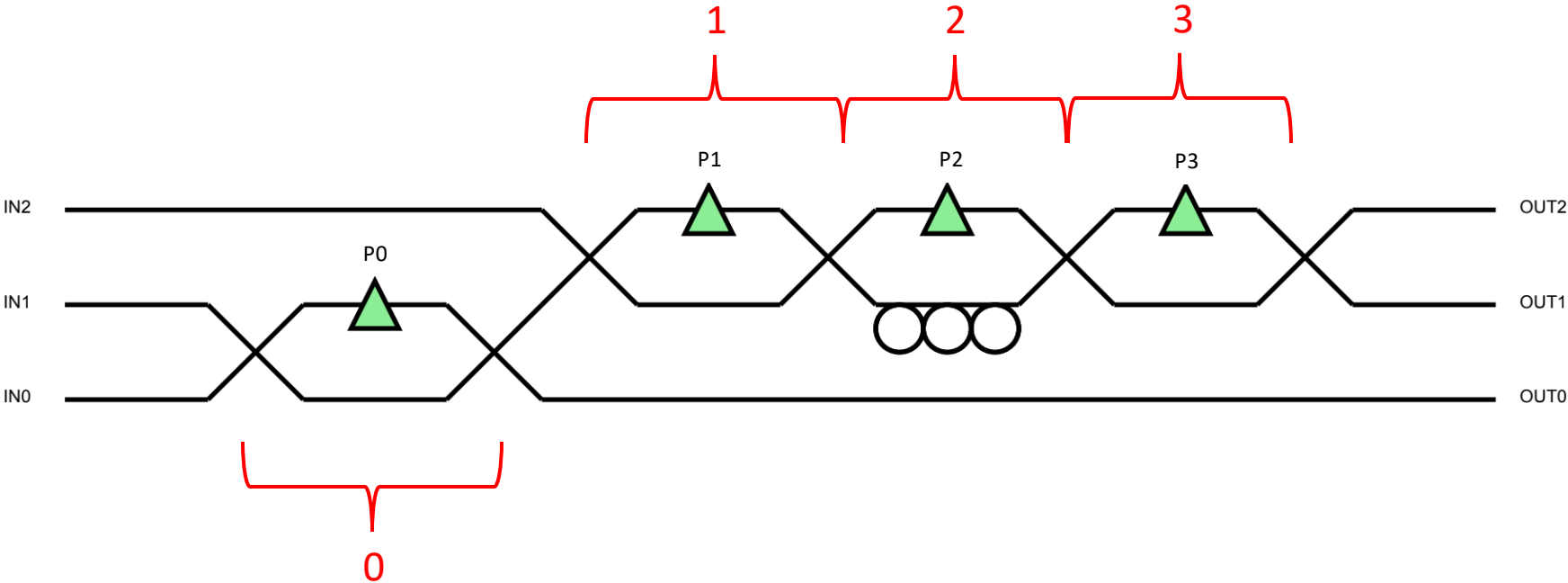
Pulsed Light Calibration

CW Light Calibration

Method Evaluation

Testing

Code



Introduction

Overview of the Chip

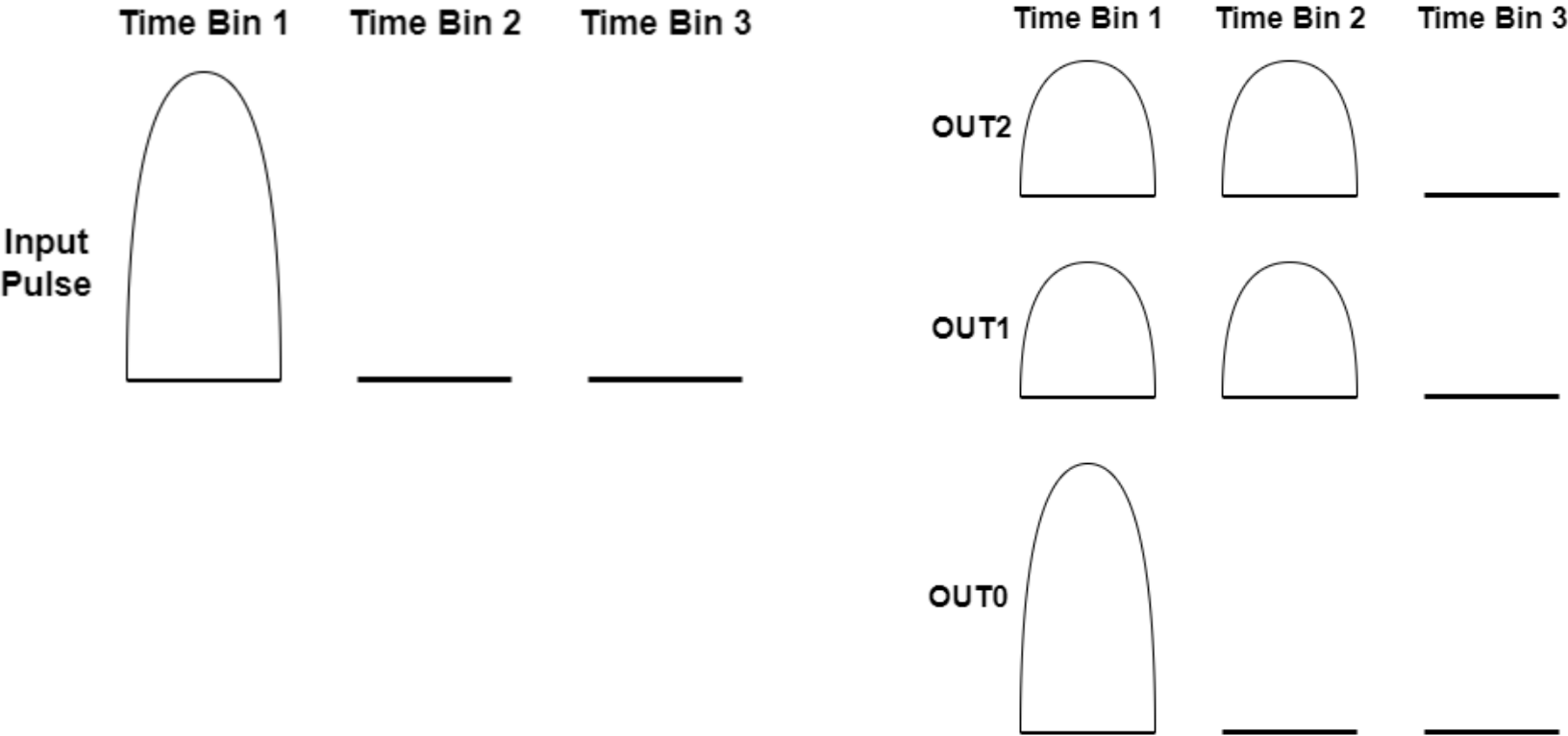
Pulsed Light Calibration

CW Light Calibration

Method Evaluation

Testing

Code



Introduction

Overview of the Chip

Pulsed Light Calibration

CW Light Calibration

Method Evaluation

Testing

Code

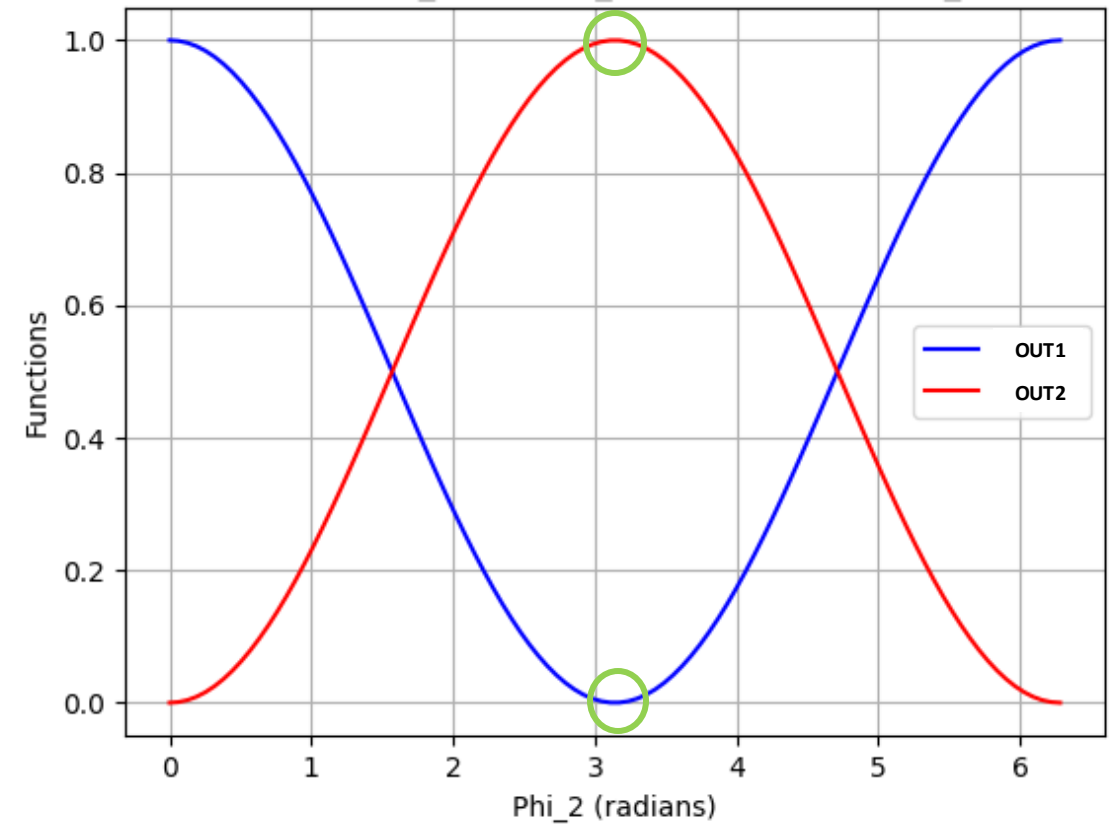


How can CW light be used to calibrate the chip?

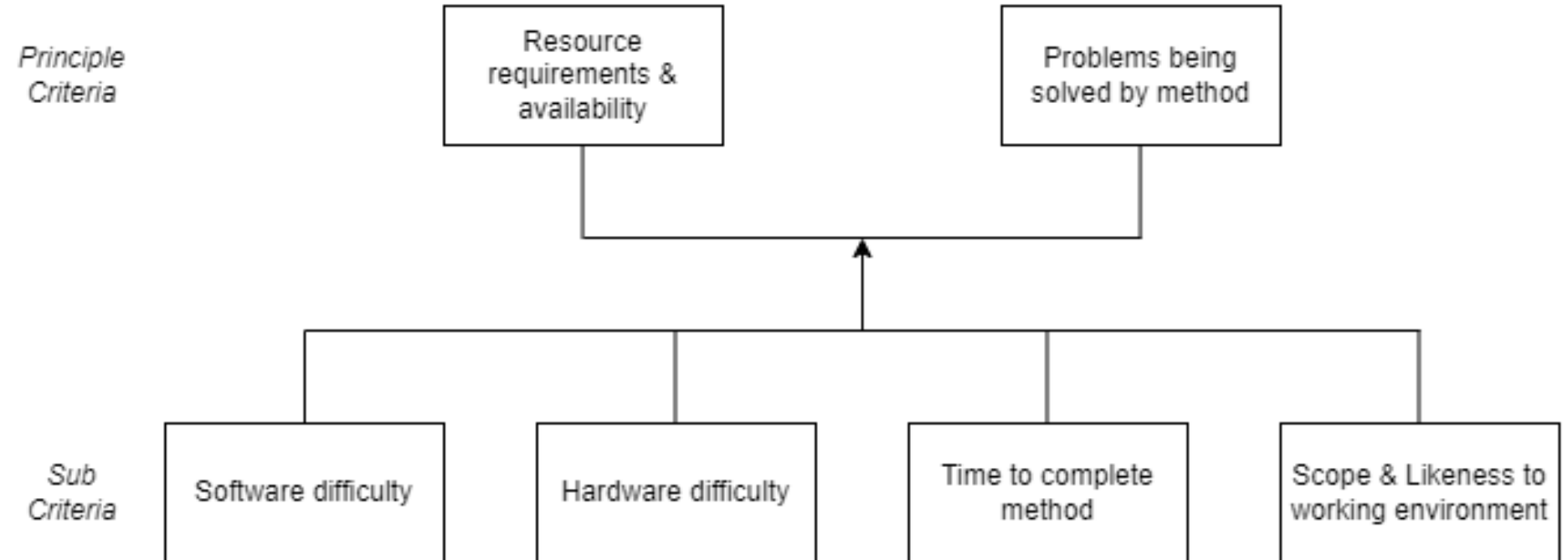
$$V = \frac{I_{max}^1 - I_{min}^2}{I_{max}^1 + I_{min}^2}$$

$$0 < V < 1$$

Plot of simulated intensity whilst varying P2



What criteria can be used to evaluate the calibration methods?



Introduction

Overview of the Chip

Pulsed Light Calibration

CW Light Calibration

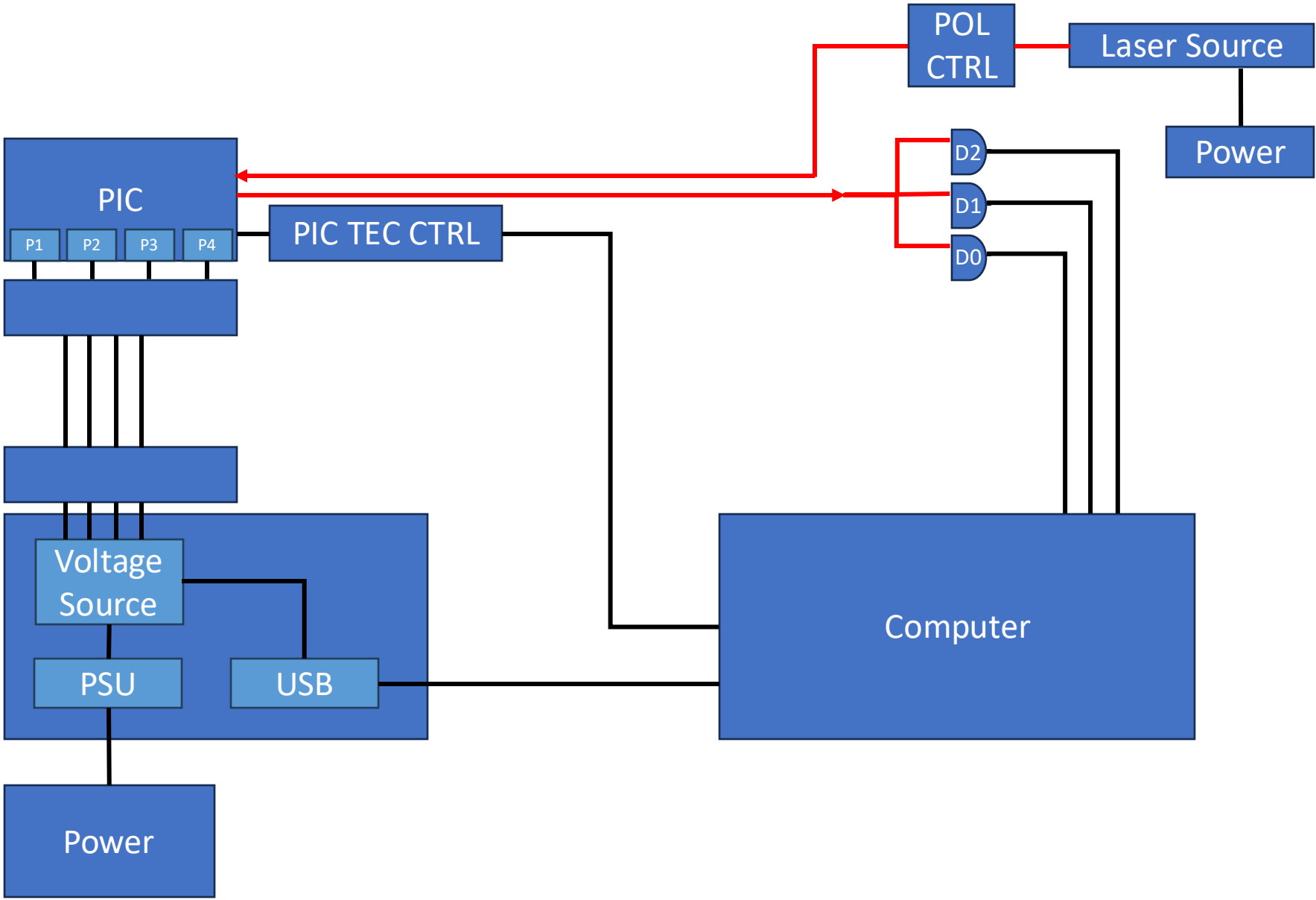
Method Evaluation

Testing

Code

- Parallel calibration system will be most valuable to the company.
 - Remove reliance on the rest of production
 - Many calibrated in short time with low technical input requirements
 - Validity can be optimised
- Current and immediate future restrictions on equipment availability lend themselves to CW calibration methods
 - Equipment to run CW calibration methods can be used without disrupting other critical testing
 - Lower cost/complexity of equipment required lends itself to scalability

What setup is needed for CW Calibration?



Introduction

Overview of the Chip

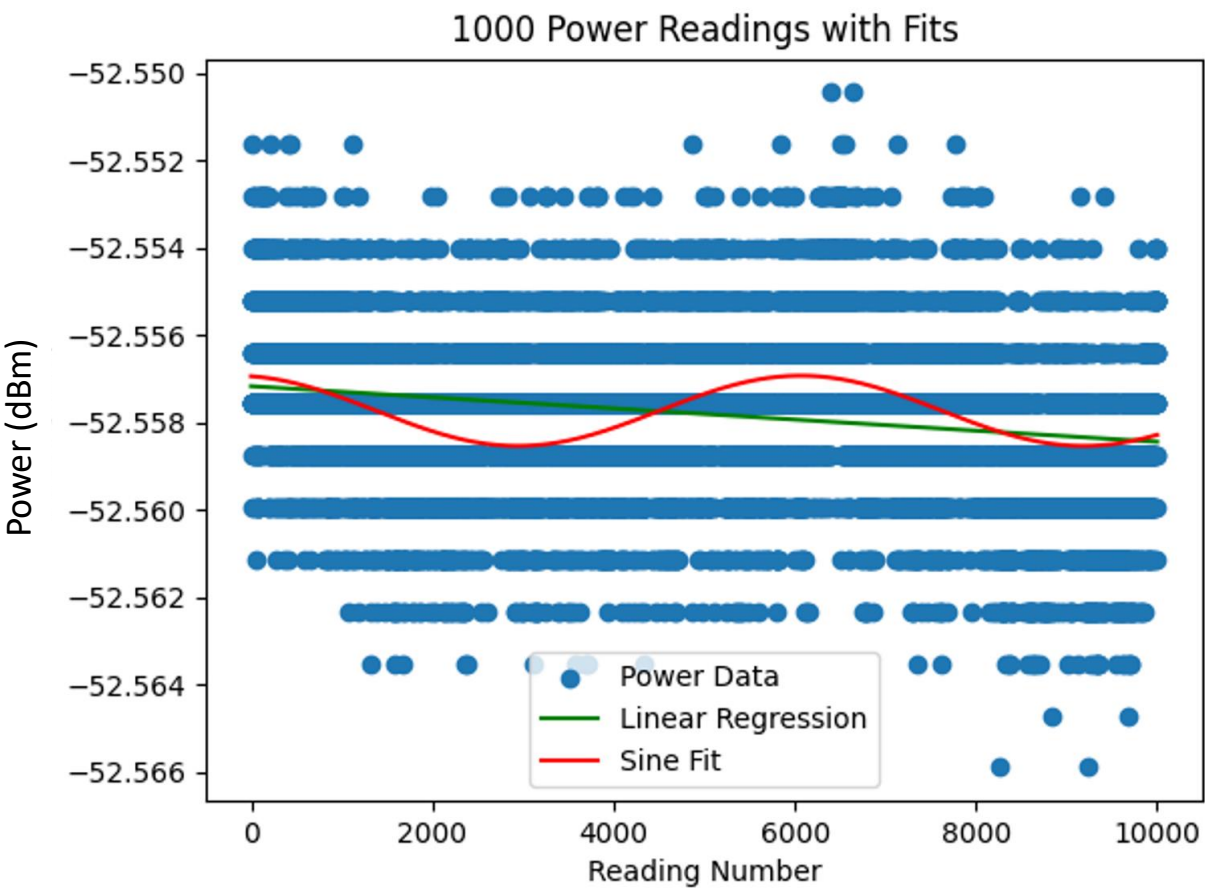
Pulsed Light Calibration

CW Light Calibration

Method Evaluation

Testing

Code



	Average Reading (W)	constant to standardise to OUT0 (W)	
OUT2	1.04939E-05	+1.77053E-06	~1.35dBm
OUT1	1.19282E-05	+3.36276E-07	~0.25dBm
OUT0	1.22645E-05	0	



Introduction

Overview of the Chip

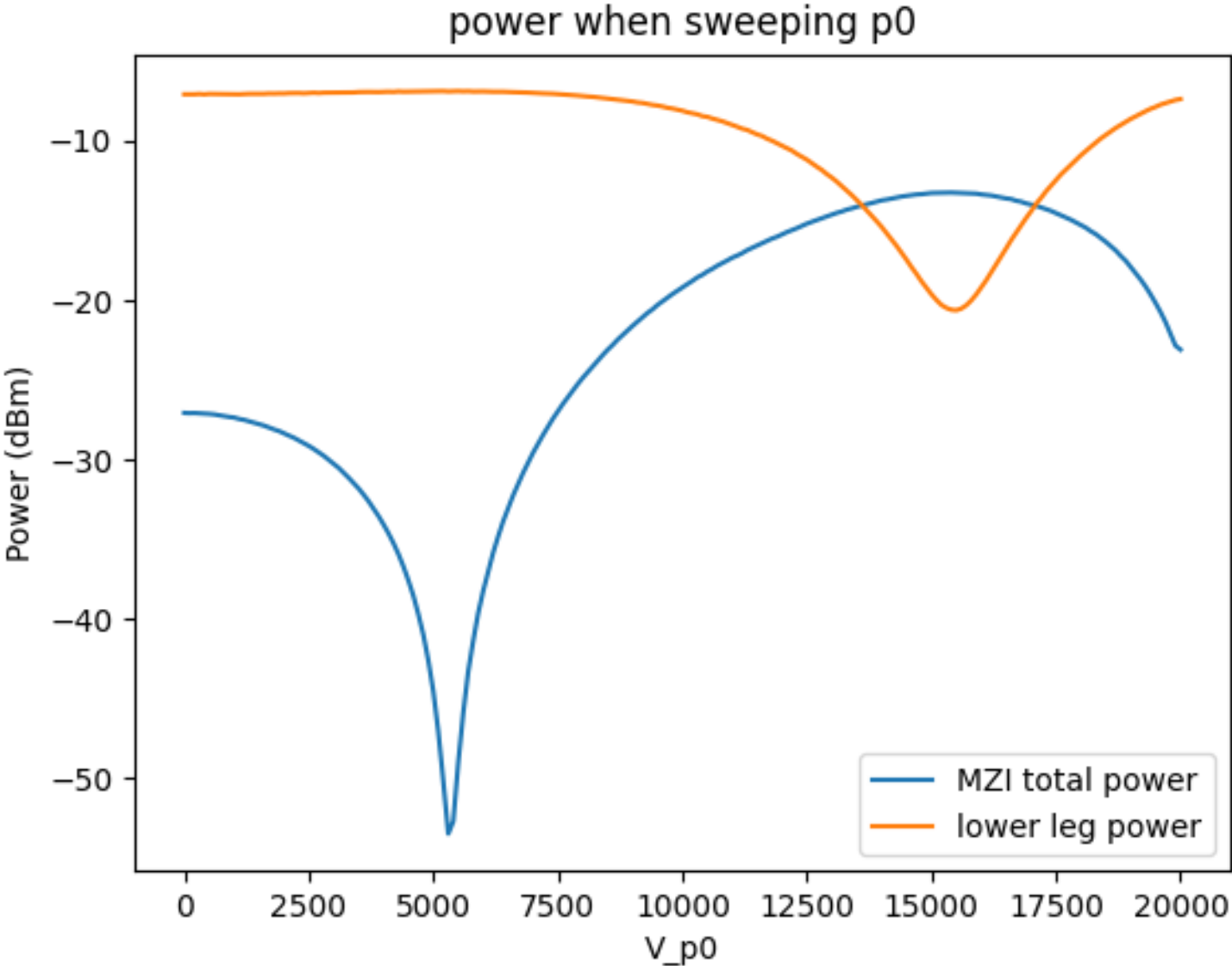
Pulsed Light Calibration

CW Light Calibration

Method Evaluation

Testing

Code



Introduction

Overview of the Chip

Pulsed Light Calibration

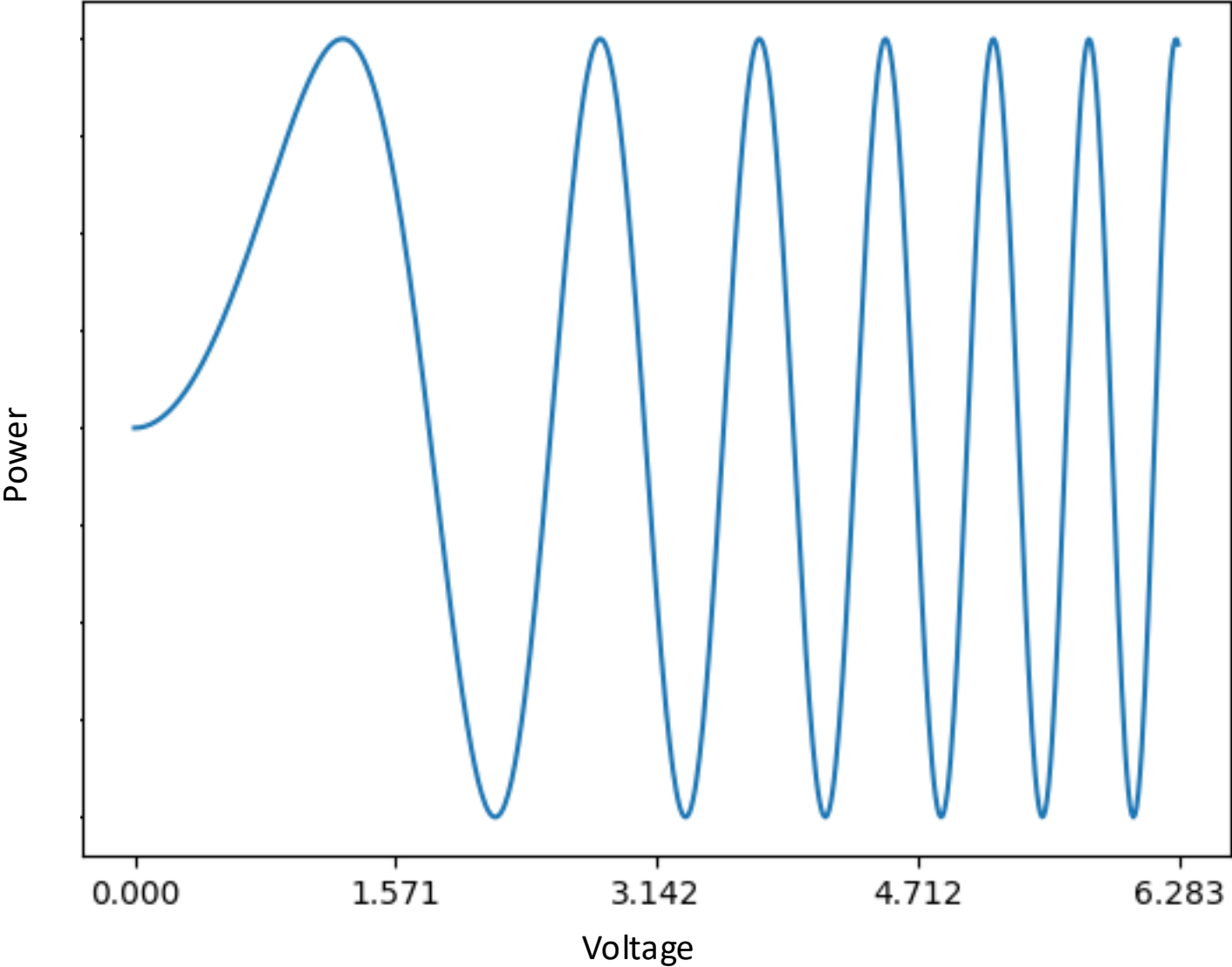
CW Light Calibration

Method Evaluation

Testing

Code

Simulated plot of how the power of one powermeter would vary with voltage



Introduction

Overview of the Chip

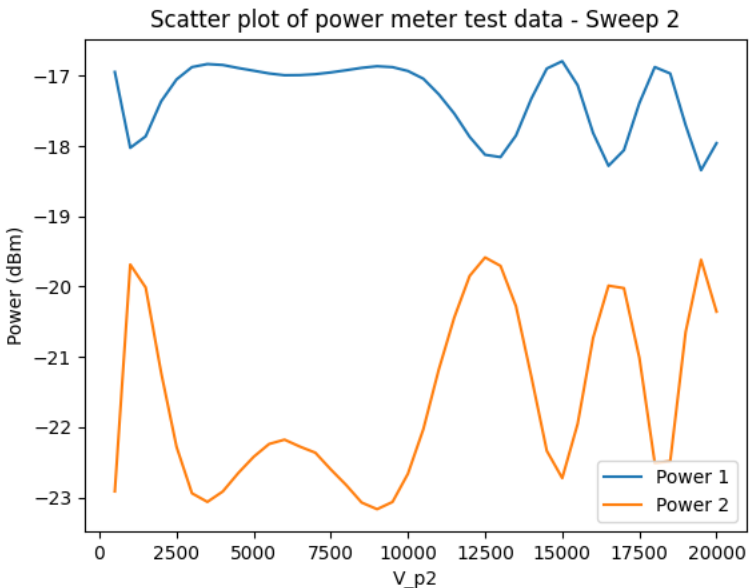
Pulsed Light Calibration

CW Light Calibration

Method Evaluation

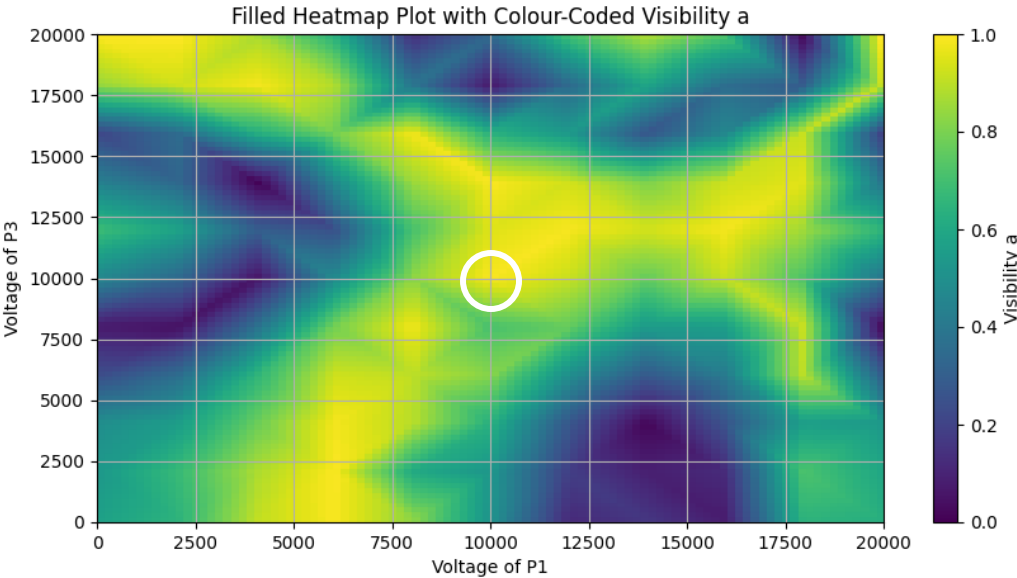
Testing

Code



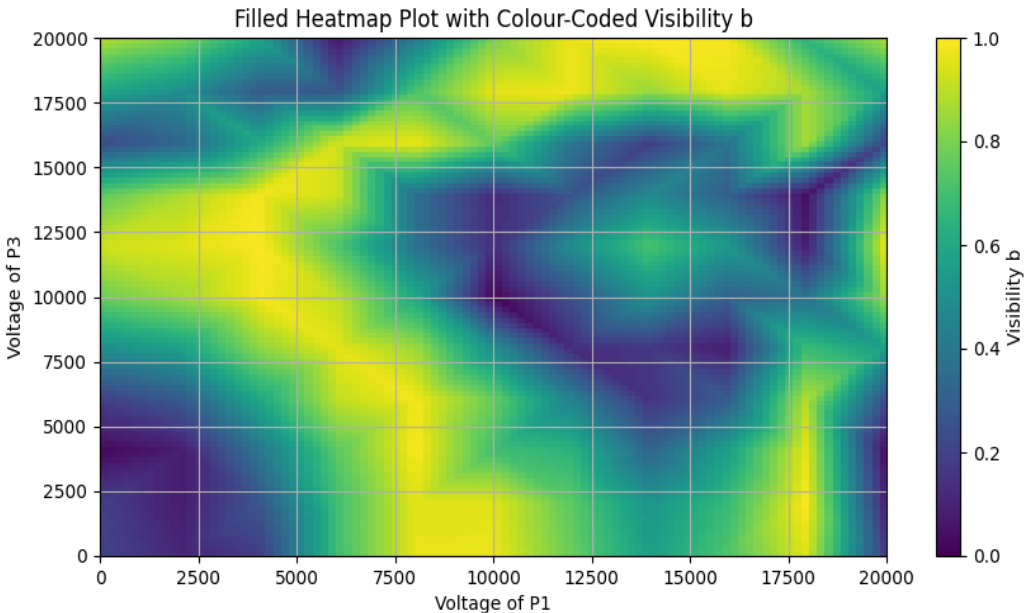


Visibility data from a full scan



$V = 0.9989$

Equivalent to 16.25dB
extinction ratio



Introduction

Overview of the Chip

Pulsed Light Calibration

CW Light Calibration

Method Evaluation

Testing

Code

The code created for calibration as an automated process

- Connection to any powermeter, temperature control and voltage control device
- Define starting voltage range and step size, baseline settle time & temperature wait threshold
- Estimated time to completion (whilst also keeping track of time spent waiting for temperature settle)
- Return all raw data, extinction ratios, visibilities
- Graphs of extinction ratios, visibilities, any raw data subset
- Find highest visibility and define new range and step size for next sweep