

ABSTRACT

We demonstrate a novel realization of Interstitial fiber, broadband, Time-domain diffuse optical spectroscopy (TD-DOS) in Null Source-Detector separation (NSDS) approach without temporal gating, by using a Superconducting Nanowire single photon detector (SNSPD) for acquisition. We test its feasibility by performing Monte Carlo simulations and comparing the absorption retrieval of the SNSPD with an ideal scenario and a standard Silicon Photomultiplier (SiPM). Consequently, as per the MEDPHOT protocol, we test experimentally, the absorption linearity of the system on tissue-equivalent liquid phantoms, and demonstrate the scattering-independent retrieval of the absorption spectrum of water using Intralipid phantoms in the wavelength range of 600-1100 nm.

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DATASET OVERVIEW

In this dataset, we provide the information regarding the data, tools to read it, the acquisition methods, and analysis techniques, so as to provide a means for others to replicate our results or use them for other purposes. Briefly, the data set is divided into 4 folders to be read in that order for better understanding.

1) 1_Overview:

- a) **Journal article.pdf** – open access article published in Journal of Biomedical Optics - <https://doi.org/10.1117/1.JBO.28.12.121202>
- b) **Index.JSON** – JSON file containing information about the files of the other folders, acting as an index for the dataset (all JSON files can be opened by notepad)
- c) **READ ME.pdf** – (currently opened file)

2) 2_Data:

- a) **Meta_data**: Contains experimental metadata
 - **Info.JSON** – JSON file containing information on the experimental setup, the samples, data acquisition, etc
 - **Table.xlsx**: Digital “Labbook” of the experimental data files and their acquisition/ analysis parameters
- b) **Raw_data**: The raw data acquired, directly as part of measurements
 - **.DAT** – Raw data containing the acquired curves to be read for analysis that can be read using the codes in Tools section
 - **.TRS/.INI** – (for internal use) Measurement settings

3) 3_Tools:

- a) **Read_DAT_matlab.m** – MATLAB script to read the raw data files into a MATLAB matrix and visualize the data
- b) **Read_DAT_python.py** – PYTHON script to read the raw data files into a PYTHON numpy array and visualize the data
- c) **Testfile.DAT** – Testfile to check the functioning of the codes

4) **4_Analysis**

- a) **Linearity_5b**: Corresponding to Figure 5(b) in the paper
 - .txt – Text file of all the analyzed data
 - .xlsx – Excel workbook of all the analyzed data with pivot tables to order and prepare the figures as published in the article
- b) **Reproducibility_6a**: Corresponding to Figure 6(a)
 - .txt – Text file of all the analyzed data
 - .xlsx – Excel workbook of all the analyzed data with pivot tables to order and prepare the figures as published in the article
- c) **Scattering_independance_6b**: Corresponding to Figure 6(b)
 - .txt – Text file of all the analyzed data
 - .xlsx – Excel workbook of all the analyzed data with pivot tables to order and prepare the figures as published in the article
- d) **Calculating_mus_musp_addn_info**:
 - .txt – Text file with additional constants and formulae required for calculating true mua/musp values
 - .JSON – Text file with additional constants and formulae required for calculating true mua/musp values
- e) **Reproducibility.FIT** – Fitting parameters file (for internal use)
- f) **Scattering_independance.FIT** - Fitting parameters file (for internal use)

(NOTE: All JSON files can be opened in notepad or any text editor)