Cable evaluation

Protocol

* Two spiky dry electrodes were positions in fp1 and fp2 at the same time
* Fp1 using the regular cable 26 awg and fp2 using cable 28 awg
* Reference electrodes were using the 26 awg cable and spi ky electrodes
* 3 recordings eyes closed, 3 recordings eyes open, 40 seconds

1. Checking impedances
   1. Openbci checking: both impendaces fp1 and fp2 oscillate around 300 kohm

A table with numbers and symbols

AI-generated content may be incorrect.

1. 3 recordings eyes closed and eyes open, 30 seconds, 3 first seconds could be cut in orer to avoud artifacts of the delay in closing the eyes ( as I recorded myself)
2. Visual inspection

Eyes open

|  |  |  |
| --- | --- | --- |
|  | EO1 | |
|  | FP1 | Fp2 |
| PSD | A graph with a blue line  AI-generated content may be incorrect. | A graph with a blue line  AI-generated content may be incorrect. |
| ALPHA POWER | 86.961 uV^2 | 109.841 uV^2 |
| BETA POWER |  |  |
| NOISE | A graph with blue and orange lines  AI-generated content may be incorrect. | |
| RELATIVE alpha POWER | 0.072 | 0.067 |
| NOISE RATIO | {'delta': 1.2328245966276967, 'theta': 0.8598885517348224, 'alpha': 0.6612346807533896, 'beta': 1.8216936997841868} | {'delta': 2.622152774538213, 'theta': 1.3529088958245938, 'alpha': 0.8798675944354596, 'beta': 2.3634700889876408} |
| METRICS QUALITY | {'alpha\_power\_uV2': 86.96074239242836,  'beta\_power\_uV2': 251.4803766878843,  'delta\_power\_uV2': 159.03375002743027,  'line\_noise\_power\_uV2': 98.41613038730944,  'zero\_crossings\_per\_sec': 57.304038004750595,  'percentage\_flatline': 0.0,  'large\_jumps': 0,  'range\_uV': 186.6911782781535,  'symmetry\_corr\_LR': 0.8600784682619796} | {'alpha\_power\_uV2': 109.84094286713527,  'beta\_power\_uV2': 313.1901092077789,  'delta\_power\_uV2': 325.909877668459,  'line\_noise\_power\_uV2': 125.59475691781392,  'zero\_crossings\_per\_sec': 55.819477434679335,  'percentage\_flatline': 0.0,  'large\_jumps': 0,  'range\_uV': 221.74598134864314,  'symmetry\_corr\_LR': 0.8600784682619798} |

A group of blue lines

AI-generated content may be incorrect.

Eyes closed

A group of blue lines

AI-generated content may be incorrect.

|  |  |  |
| --- | --- | --- |
|  | EO2 | |
|  | FP1 | Fp2 |
| PSD | A graph of a person's period  AI-generated content may be incorrect. |  |
| ALPHA POWER |  |  |
| BETA POWER |  |  |
| NOISE | A graph of a sound wave  AI-generated content may be incorrect. | |
| RELATIVE alpha POWER |  |  |
| NOISE RATIO | {'delta': 0.9755229093069282, 'theta': 1.0445293255230315, 'alpha': 0.7225529847411846, 'beta': 2.2546642631652194} | {'delta': 2.1323337702862752, 'theta': 1.4433429983197053, 'alpha': 0.9078763268222189, 'beta': 2.6826973965254663} |
| METRICS QUALITY | {'alpha\_power\_uV2': 76.20300845598565,  'beta\_power\_uV2': 255.4812725692296,  'delta\_power\_uV2': 95.20698560466417,  'line\_noise\_power\_uV2': 63.21071861820434,  'zero\_crossings\_per\_sec': 57.2700296735905,  'percentage\_flatline': 0.0,  'large\_jumps': 0,  'range\_uV': 173.91972086546912,  'symmetry\_corr\_LR': 0.8775689615018331} | {'alpha\_power\_uV2': 97.38177457590787,  'beta\_power\_uV2': 308.5681574593464,  'delta\_power\_uV2': 219.20671502094166,  'line\_noise\_power\_uV2': 100.91696708374562,  'zero\_crossings\_per\_sec': 55.97181008902077,  'percentage\_flatline': 0.0,  'large\_jumps': 0,  'range\_uV': 222.1873004822329,  'symmetry\_corr\_LR': 0.8775689615018331} |

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|  | EO3 | |
|  | FP1 | Fp2 |
| PSD | A graph with lines and numbers  AI-generated content may be incorrect. | A graph of a graph showing the number of frequency  AI-generated content may be incorrect. |
| NOISE | A graph of a sound wave  AI-generated content may be incorrect. | |
| NOISE RATIO | {'delta': 0.9022061179241994, 'theta': 0.9891695769814548, 'alpha': 0.7071475076064468, 'beta': 2.5052144308651427} | {'delta': 1.6172750650401952, 'theta': 1.3114675087579606, 'alpha': 0.8696980148178305, 'beta': 3.096810385456438} |
| METRICS QUALITY | {'alpha\_power\_uV2': 80.47412008808158,  'beta\_power\_uV2': 303.0582715669054,  'delta\_power\_uV2': 97.69934887542202,  'line\_noise\_power\_uV2': 42.983107951834,  'zero\_crossings\_per\_sec': 58.25783454626467,  'percentage\_flatline': 0.0,  'large\_jumps': 0,  'range\_uV': 157.16706163822448,  'symmetry\_corr\_LR': 0.9169353976670045} | {'alpha\_power\_uV2': 98.66242641578874,  'beta\_power\_uV2': 374.5609506291501,  'delta\_power\_uV2': 178.23782231494306,  'line\_noise\_power\_uV2': 66.07208486328332,  'zero\_crossings\_per\_sec': 55.80721817911778,  'percentage\_flatline': 0.0,  'large\_jumps': 0,  'range\_uV': 196.14216869813603,  'symmetry\_corr\_LR': 0.9169353976670046} |

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|  | EC1 | |
|  | FP1 | Fp2 |
| PSD | A graph showing a number of frequency  AI-generated content may be incorrect. | A graph with a blue line  AI-generated content may be incorrect. |
| NOISE | A graph with blue and red lines  AI-generated content may be incorrect. | |
| NOISE RATIO | {'delta': 1.2005789726772027, 'theta': 1.2655556744778524, 'alpha': 1.063702792496175, 'beta': 2.9267036803099953} | {'delta': 1.9571361684365198, 'theta': 1.527146209811782, 'alpha': 1.2000139533678886, 'beta': 3.3332595993399283} |
| METRICS QUALITY | {'alpha\_power\_uV2': 107.5961831206613,  'beta\_power\_uV2': 295.40228378702375,  'delta\_power\_uV2': 112.41682300389607,  'line\_noise\_power\_uV2': 14.97341099017701,  'zero\_crossings\_per\_sec': 51.135520261243876,  'percentage\_flatline': 0.0,  'large\_jumps': 0,  'range\_uV': 141.0115860049683,  'symmetry\_corr\_LR': 0.9589090100175088} | {'alpha\_power\_uV2': 128.41681024660696,  'beta\_power\_uV2': 358.7383074737281,  'delta\_power\_uV2': 193.3645013202345,  'line\_noise\_power\_uV2': 21.062401874174537,  'zero\_crossings\_per\_sec': 51.469496808668545,  'percentage\_flatline': 0.0,  'large\_jumps': 0,  'range\_uV': 175.04940411149335,  'symmetry\_corr\_LR': 0.9589090100175087} |

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|  | EC2 | |
|  | FP1 | Fp2 |
| PSD | A graph of a graph showing a number of frequency  AI-generated content may be incorrect. | A graph of a graph  AI-generated content may be incorrect. |
| NOISE | A graph of a sound wave  AI-generated content may be incorrect. | |
| NOISE RATIO | {'delta': 0.6887075424031442, 'theta': 1.290931850800313, 'alpha': 0.785285466242677, 'beta': 2.5315296293589356} | {'delta': 1.0717842707778336, 'theta': 1.8926680257658834, 'alpha': 1.0035650609417404, 'beta': 3.2614230732044276} |
| METRICS QUALITY | {'alpha\_power\_uV2': 84.68336771389123,  'beta\_power\_uV2': 285.14334810525963,  'delta\_power\_uV2': 71.38482561400555,  'line\_noise\_power\_uV2': 50.404782850827644,  'zero\_crossings\_per\_sec': 58.04631828978623,  'percentage\_flatline': 0.0,  'large\_jumps': 0,  'range\_uV': 147.6947726823022,  'symmetry\_corr\_LR': 0.9597943922023056} | {'alpha\_power\_uV2': 110.82971963415841,  'beta\_power\_uV2': 372.7359040748207,  'delta\_power\_uV2': 116.89535059987544,  'line\_noise\_power\_uV2': 87.66690944792379,  'zero\_crossings\_per\_sec': 55.59679334916865,  'percentage\_flatline': 0.0,  'large\_jumps': 0,  'range\_uV': 159.21557383163275,  'symmetry\_corr\_LR': 0.9597943922023056} |

|  |  |  |
| --- | --- | --- |
|  | EC3 | |
|  | FP1 | Fp2 |
| PSD | A graph of a graph showing a number of frequency  AI-generated content may be incorrect. | A graph of a graph showing a number of frequency  AI-generated content may be incorrect. |
| NOISE | A graph with blue and orange lines  AI-generated content may be incorrect. | |
| NOISE RATIO | {'delta': 1.2667547209045036, 'theta': 1.3094507247993203, 'alpha': 0.9788340338825489, 'beta': 2.5567444014971006} | {'delta': 2.4685051995057354, 'theta': 1.7867484076253184, 'alpha': 1.1083464895242112, 'beta': 2.8366288539545965} |
| METRICS QUALITY | {'alpha\_power\_uV2': 93.95787424018539,  'beta\_power\_uV2': 268.51191181603065,  'delta\_power\_uV2': 115.13993315571156,  'line\_noise\_power\_uV2': 6.671694106134741,  'zero\_crossings\_per\_sec': 51.58199643493761,  'percentage\_flatline': 0.0,  'large\_jumps': 0,  'range\_uV': 182.96795673437083,  'symmetry\_corr\_LR': 0.9085901904927783} | {'alpha\_power\_uV2': 117.5123943474753,  'beta\_power\_uV2': 325.19855664707524,  'delta\_power\_uV2': 245.5173174857619,  'line\_noise\_power\_uV2': 14.276031671816423,  'zero\_crossings\_per\_sec': 47.27421271538918,  'percentage\_flatline': 0.0,  'large\_jumps': 0,  'range\_uV': 191.35716972592047,  'symmetry\_corr\_LR': 0.9085901904927784} |

MEAN and IQR of 3 recordings

RATIO Eyes open

FP1- thick wire

delta 1.0369 ± 0.1653

theta 0.9645 ± 0.0923

alpha 0.6970 ± 0.0307

beta 2.1939 ± 0.3418

FP2-thin wire

delta 2.1239 ± 0.5024

theta 1.3692 ± 0.0659

alpha 0.8858 ± 0.0191

beta 2.7143 ± 0.3667

Ratio eyes closed

Fp1

delta 1.0520 ± 0.2890

theta 1.2886 ± 0.0219

alpha 0.9426 ± 0.1392

beta 2.6717 ± 0.1976

Fp2

delta 1.8325 ± 0.6984

theta 1.7355 ± 0.1828

alpha 1.1040 ± 0.0982

beta 3.1438 ± 0.2483

METRICS

AVERAGE OF 3 recordings

|  |  |
| --- | --- |
| EOFP1 | EOFP2 |
| alpha\_power\_uV2 81.21  beta\_power\_uV2 270.01  delta\_power\_uV2 117.31  line\_noise\_power\_uV2 68.20  zero\_crossings\_per\_sec 57.61  percentage\_flatline 0.00  large\_jumps 0.00  range\_uV 172.59  symmetry\_corr\_LR 0.88  dtype: float64 | alpha\_power\_uV2 101.96  beta\_power\_uV2 332.11  delta\_power\_uV2 241.12  line\_noise\_power\_uV2 97.53  zero\_crossings\_per\_sec 55.87  percentage\_flatline 0.00  large\_jumps 0.00  range\_uV 213.36  symmetry\_corr\_LR 0.88  dtype: float64 |
| ECFP1 | ECFP2 |
| alpha\_power\_uV2 95.41  beta\_power\_uV2 283.02  delta\_power\_uV2 99.65  line\_noise\_power\_uV2 24.02  zero\_crossings\_per\_sec 53.59  percentage\_flatline 0.00  large\_jumps 0.00  range\_uV 157.22  symmetry\_corr\_LR 0.94 | alpha\_power\_uV2 118.92  beta\_power\_uV2 352.22  delta\_power\_uV2 185.26  line\_noise\_power\_uV2 41.00  zero\_crossings\_per\_sec 51.45  percentage\_flatline 0.00  large\_jumps 0.00  range\_uV 175.21  symmetry\_corr\_LR 0.94 |

STATS

EYES CLOSED

A screenshot of a graph

AI-generated content may be incorrect.

With eyes closed, alpha and beta have significant differences, with higher values in FP1. WE only work with 3 recordings so we can only expect a trend

EYES OPEN

A table of numbers and symbols

AI-generated content may be incorrect.

With eyes open, we also observe a trend with higher values for fp1 than fp2

STAT DESCRIPTIVE

EYES CLOSED

A group of blue and white diagrams

AI-generated content may be incorrect.

EYES OPEN

A group of blue and white graphs

AI-generated content may be incorrect.