*LIGO Laboratory / LIGO Scientific Collaboration*

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TwinCAT Library for Squeezer OPO Resonance

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| **Library** |
| Title | SqzOpoResonance |
| Version | 1 |
| TwinCAT version | 2.11 |
| Name space | – |
| Author | Daniel Sigg |
| Description | Helps finding the IR resonance of the squeezer OPO.The OPO is doubly resonance for green and IR. The green resonance is derived from the OPO transmitted light in green.The OPO is either operated with a seed beam or with the CLF beam. The IR resonance is either derived from the power of the seed beam at the output of the OPO, or from the RF power in the CLF locking signal. |
| Error codes | 0x01 – Nominal seed power is zero0x02 – Invalid CLF RF power0x04 – Nominal CLF RF is not positive |
| Library dependencies: | Error, SaveRestore |

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| **Resonance Condition Type**TYPE IrResonanceConditionEnum : ( IrResonanceClf, (\* CLF \*) IrResonanceSeed (\* Seed \*));END\_TYPE |
| Type name | IrResonanceConditionEnum |
| Description | Enumeration of IR resonance conditions |
| Definition | ENUM |
| Element | Name: IrResonanceClfDescription: CLF is resonant |
| Element | Name: IrResonanceSeedDescription: Seed is resonant |

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| **User Interface Type**TYPE OpoIrResonanceStruct :STRUCT Error: ErrorStruct; Condition: IrResonanceConditionEnum; Trigger: LREAL;  Clf\_Rf: LREAL;  Clf\_Nom: LREAL; Clf\_Norm: LREAL; Seed\_Pwr: LREAL; Seed\_Nom: LREAL; Seed\_Norm: LREAL;END\_STRUCTEND\_TYPE |
| Type name | OpoIrResonanceStruct |
| Description | Structure of the user interface tags that are used to check the IR resonance of the OPO |
| Definition | STRUCT |
| Output Tag | Name: ErrorType: ErrorStructDescription: For error handler |
| Input Tag | Name: ConditionType: IrResonanceConditionEnumDescription: Resonance condition |
| Output Tag | Name: TriggerType: LREALDescription: Trigger value (either CLF norm or Seed Norm) |
| Output Tag | Name: Clf\_RfType: LREALDescription: CLF RF power in Volts |
| Input Tag | Name: Clf\_NomType: LREALDescription: Nominal CLF RF power in V |
| Output Tag | Name: Clf\_NormType: LREALDescription: Normalized CLF RF power |
| Output Tag | Name: Seed\_PwrType: LREALDescription: Seed power in mW |
| Input Tag | Name: Seed\_NomType: LREALDescription: Nominal seed power in mW |
| Output Tag | Name: Seed\_NormType: LREALDescription: Normalized seed power |

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| **Function Block**FUNCTION\_BLOCK OpoIrResonanceFBVAR\_INPUT Request: SaveRestoreEnum; SeedPwr: LREAL;  ClfRf: LREAL;END\_VARVAR\_IN\_OUT OpoRes: OpoIrResonanceStruct; OpoResInit: OpoIrResonanceStruct;END\_VARVAR\_OUTPUT Trigger: LREAL; END\_VAR |
| Type name | OpoIrResonanceFB |
| Description | Function block that helps finding the IR resonance of the OPO |
| Input argument  | Name: RequestType: SaveRestoreEnumDescription: Save restore command |
| Input Tag | Name: SeedPwrType: LREALDescription: Normalized seed power |
| Input Tag | Name: ClfRfType: LREALDescription: Normalized CLF RF power |
| In/out Tag | Name: OpoResType: OpoIrResonanceStructDescription: User Interface structur |
| In/out Tag | Name: OpoResInitType: OpoIrResonanceStructDescription: Save/restore variables in persistent memory |
| Output Tag | Name: TriggerType: LREALDescription: Trigger for the PZT scan |