*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 zero  0x02 – Invalid CLF RF power  0x04 – 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: IrResonanceClf  Description: CLF is resonant |
| Element | Name: IrResonanceSeed  Description: 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\_STRUCT  END\_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: Error  Type: ErrorStruct  Description: For error handler |
| Input Tag | Name: Condition  Type: IrResonanceConditionEnum  Description: Resonance condition |
| Output Tag | Name: Trigger  Type: LREAL  Description: Trigger value (either CLF norm or Seed Norm) |
| Output Tag | Name: Clf\_Rf  Type: LREAL  Description: CLF RF power in Volts |
| Input Tag | Name: Clf\_Nom  Type: LREAL  Description: Nominal CLF RF power in V |
| Output Tag | Name: Clf\_Norm  Type: LREAL  Description: Normalized CLF RF power |
| Output Tag | Name: Seed\_Pwr  Type: LREAL  Description: Seed power in mW |
| Input Tag | Name: Seed\_Nom  Type: LREAL  Description: Nominal seed power in mW |
| Output Tag | Name: Seed\_Norm  Type: LREAL  Description: Normalized seed power |

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