



LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY

LIGO Laboratory / LIGO Scientific Collaboration

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Advanced LIGO

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TwinCAT Library for Squeezer OPO Resonance

Daniel Sigg

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LIGO Scientific Collaboration

This is an internal working note
of the LIGO Laboratory.

California Institute of Technology
LIGO Project – MS 18-34
1200 E. California Blvd.
Pasadena, CA 91125
Phone (626) 395-2129
Fax (626) 304-9834
E-mail: info@ligo.caltech.edu

Massachusetts Institute of Technology
LIGO Project – NW22-295
185 Albany St
Cambridge, MA 02139
Phone (617) 253-4824
Fax (617) 253-7014
E-mail: info@ligo.mit.edu

LIGO Hanford Observatory
P.O. Box 159
Richland WA 99352
Phone 509-372-8106
Fax 509-372-8137

LIGO Livingston Observatory
P.O. Box 940
Livingston, LA 70754
Phone 225-686-3100
Fax 225-686-7189

<http://www.ligo.caltech.edu/>

Library	
Title	SqzOpoResonance
Version	1
TwinCAT version	2.11
Name space	–
Author	Daniel Sigg
Description	<p>Helps finding the IR resonance of the squeezer OPO.</p> <p>The OPO is doubly resonance for green and IR. The green resonance is derived from the OPO transmitted light in green.</p> <p>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.</p>
Error codes	<p>0x01 – Nominal seed power is zero</p> <p>0x02 – Invalid CLF RF power</p> <p>0x04 – Nominal CLF RF is not positive</p>
Library dependencies:	Error, SaveRestore

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

User Interface Type

TYPE OpolrResonanceStruct :

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	OpolrResonanceStruct
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

Function Block FUNCTION_BLOCK OpolrResonanceFB VAR_INPUT Request: SaveRestoreEnum; SeedPwr: LREAL; ClfRf: LREAL; END_VAR VAR_IN_OUT OpoRes: OpolrResonanceStruct; OpoResInit: OpolrResonanceStruct; END_VAR VAR_OUTPUT Trigger: LREAL; END_VAR	
Type name	OpolrResonanceFB
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: OpolrResonanceStruct Description: User Interface structur
In/out Tag	Name: OpoResInit Type: OpolrResonanceStruct Description: Save/restore variables in persistent memory
Output Tag	Name: Trigger Type: LREAL Description: Trigger for the PZT scan