



# Automated and user-friendly Connectivity Test

Lorenzo Rocchi (INFN Frascati)

Tutors:

Marco Santimaria (INFN Frascati)

Barbara Sciascia (INFN Frascati)

# Who am I?



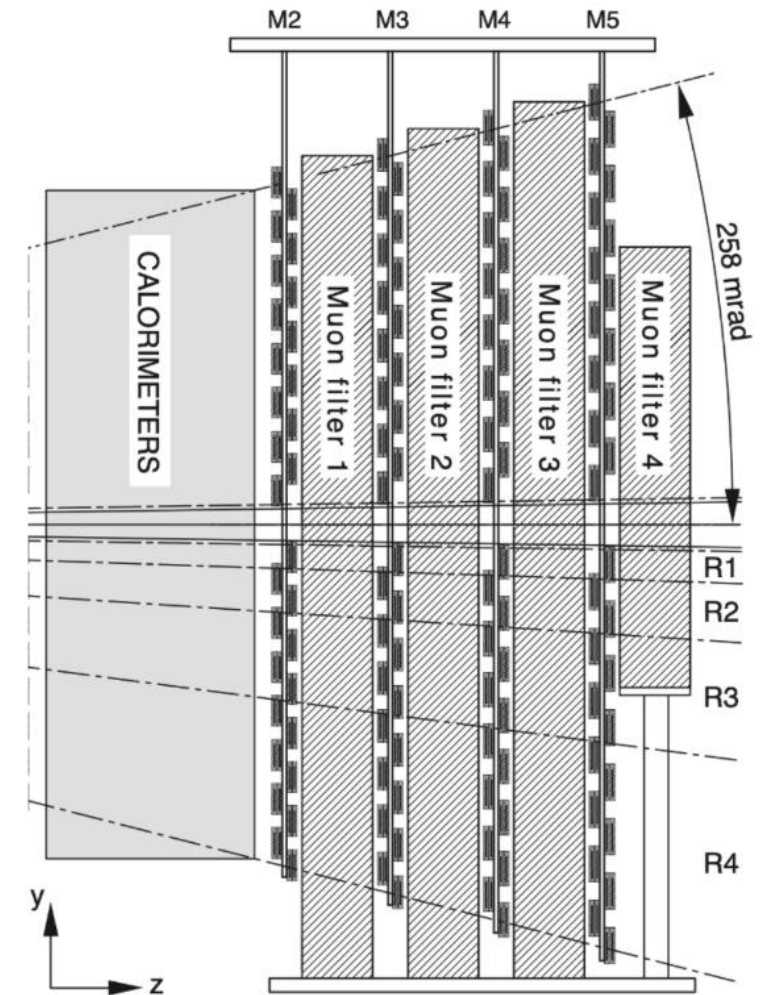
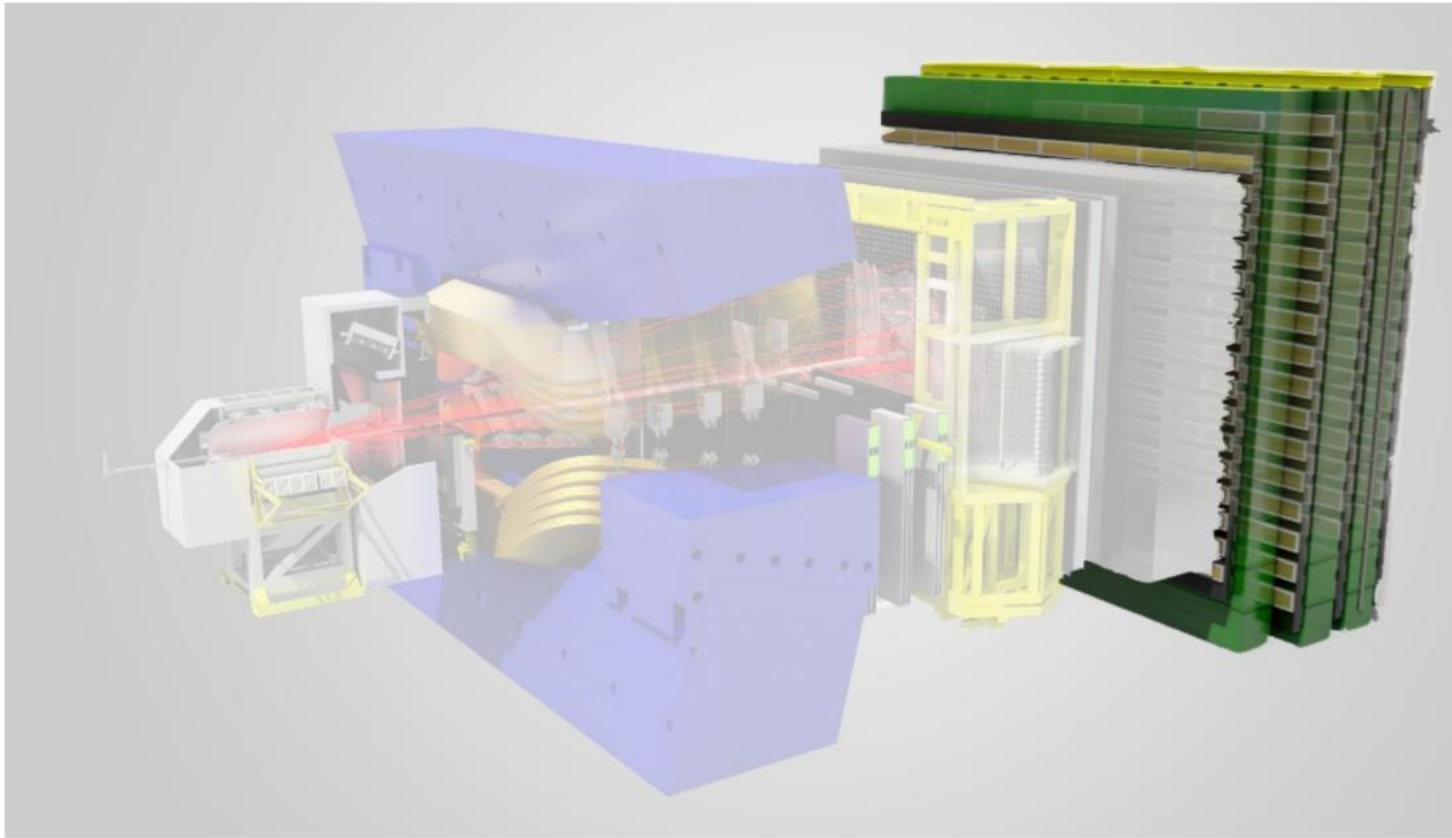
---

MSc Student in Particle Physics @ Sapienza University of Rome

**Summer Student** @ INFN Laboratori Nazionali di Frascati  
under the LHCb group.

During my project I mainly worked on the **renewal of WinCC panels** for the muon system, with a particular focus on the automation and user-friendliness of the Connectivity Test.

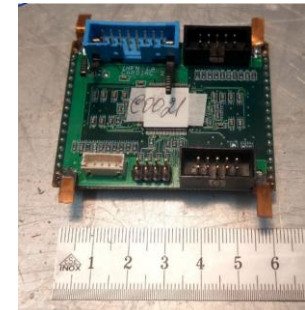
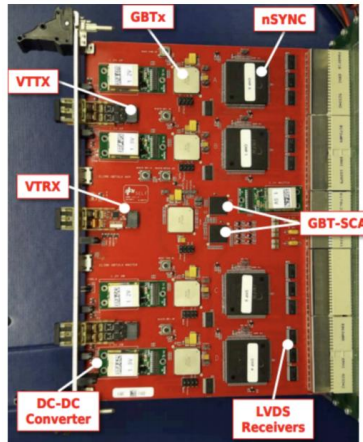
# The muon system



# The main characters: nODEs & FEBs

Front-End Boards (FEBs) amplify, shape and filter the chamber's signal to remove noise. Each chamber can be connected to several FEBs (up to 14), which then pass the logical channels to the new Off-Detector Electronics (nODE).

The system contains 144 nODEs, each equipped with four nSYNC chips for advanced processing: bunch crossing identification, clock synchronization, buffering, measurement of hit times, and coarse alignment. Each nSYNC can manage up to 48 channels



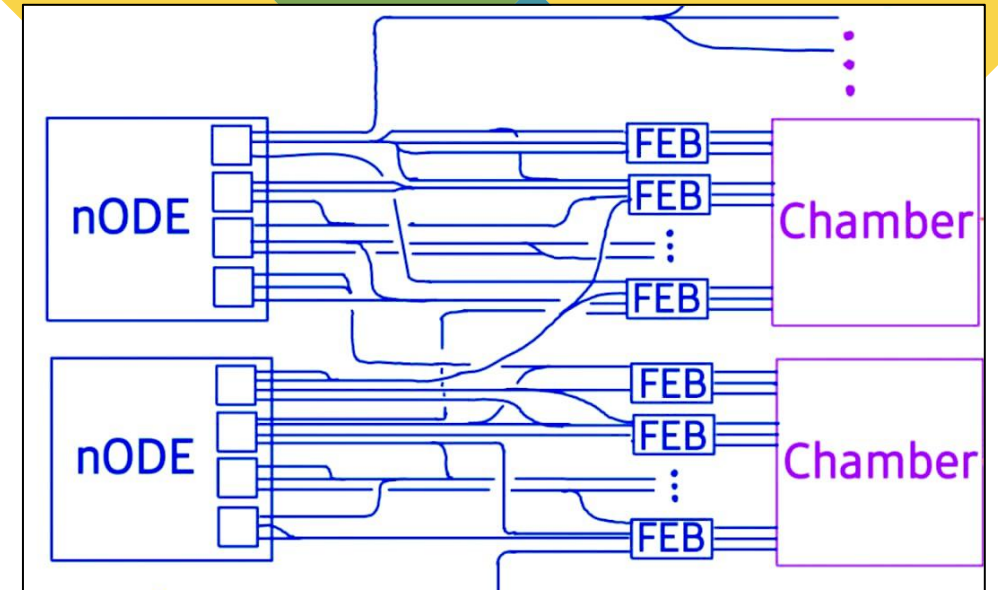
# What's a Connectivity Test?

The Connectivity Test (CT) of the LHCb muon system is used to verify that **all copper cable connections** between the front-end electronics (FEBs) and the readout modules (nODEs/nSBs) are correct and working.

During the test, test pulses are sent through the system, and their arrival is checked to confirm whether:

- the **signal reaches the expected** position,
- the signal appears **noisy** or **weak**,
- it is **missing** altogether,
- or it appears in the **wrong place**.

The results help identify faulty cables, wrong connections, or hardware issues, ensuring that the entire muon readout system is properly wired and ready to record data.





# Main Goal: Renew the CT

The original panel designed by Sofia was powerful but mainly designed for expert users.

Our goal is to completely renew this system by:

- Automating the test so that even **non-experts** can run it correctly;
- Redesigning the interface to provide clear, **user-friendly** result visualization;
- Consolidating multiple functions into a single panel, making the entire test as simple as pressing one button.

The screenshot displays the 'Select nODE:' interface. On the left, a table lists nodes and their test results. The 'Quadrant' is set to 'Q1'. On the right, a grid shows 'Select NSYNC channels' for four quadrants (A, B, C, D). Each quadrant has a 4x4 grid of channels (0-11) with checkboxes. Below the grid are buttons for 'Start connectivity test' and 'Stop connectivity test', and a 'Manager status: STOPPED' indicator.

nODE	Test
Q1M2R11	NO
Q1M2R12	NO
Q1M2R21	NO
Q1M2R22	NO
Q1M2R23	NO
Q1M2R31	NO
Q1M2R32	NO
Q1M2R33	NO
Q1M2R34	NO
Q1M2R35	NO
Q1M2R36	NO
Q1M2R41	NO
Q1M2R42	NO
Q1M2R43	NO
Q1M2R44	NO
Q1M2R45	NO
Q1M2R46	NO
Q1M3R11	NO
Q1M3R12	NO
Q1M3R21	NO
Q1M3R22	NO
Q1M3R31	NO
Q1M3R32	NO
Q1M3R41	NO
Q1M3R42	NO
Q1M4R11	NO
Q1M4R12	NO
Q1M4R21	NO
Q1M4R31	NO
Q1M4R41	NO
Q1M5R11	NO
Q1M5R12	NO
Q1M5R21	NO
Q1M5R31	NO
Q1M5R41	NO
Q1M5R42	NO

Quadrant: Q1

Select NSYNC channels

NSYNC_A				NSYNC_B				NSYNC_C				NSYNC_D																			
<input checked="" type="checkbox"/>	0	<input type="checkbox"/>	12	<input type="checkbox"/>	24	<input type="checkbox"/>	36	<input type="checkbox"/>	0	<input type="checkbox"/>	12	<input type="checkbox"/>	24	<input type="checkbox"/>	36	<input type="checkbox"/>	0	<input type="checkbox"/>	12	<input type="checkbox"/>	24	<input type="checkbox"/>	36	<input type="checkbox"/>	0	<input type="checkbox"/>	12	<input type="checkbox"/>	24	<input type="checkbox"/>	36
<input checked="" type="checkbox"/>	1	<input type="checkbox"/>	13	<input type="checkbox"/>	25	<input type="checkbox"/>	37	<input type="checkbox"/>	1	<input type="checkbox"/>	13	<input type="checkbox"/>	25	<input type="checkbox"/>	37	<input type="checkbox"/>	1	<input type="checkbox"/>	13	<input type="checkbox"/>	25	<input type="checkbox"/>	37	<input type="checkbox"/>	1	<input type="checkbox"/>	13	<input type="checkbox"/>	25	<input type="checkbox"/>	37
<input checked="" type="checkbox"/>	2	<input type="checkbox"/>	14	<input type="checkbox"/>	26	<input type="checkbox"/>	38	<input type="checkbox"/>	2	<input type="checkbox"/>	14	<input type="checkbox"/>	26	<input type="checkbox"/>	38	<input type="checkbox"/>	2	<input type="checkbox"/>	14	<input type="checkbox"/>	26	<input type="checkbox"/>	38	<input type="checkbox"/>	2	<input type="checkbox"/>	14	<input type="checkbox"/>	26	<input type="checkbox"/>	38
<input checked="" type="checkbox"/>	3	<input type="checkbox"/>	15	<input type="checkbox"/>	27	<input type="checkbox"/>	39	<input type="checkbox"/>	3	<input type="checkbox"/>	15	<input type="checkbox"/>	27	<input type="checkbox"/>	39	<input type="checkbox"/>	3	<input type="checkbox"/>	15	<input type="checkbox"/>	27	<input type="checkbox"/>	39	<input type="checkbox"/>	3	<input type="checkbox"/>	15	<input type="checkbox"/>	27	<input type="checkbox"/>	39
<input type="checkbox"/>	4	<input type="checkbox"/>	16	<input type="checkbox"/>	28	<input type="checkbox"/>	40	<input type="checkbox"/>	4	<input type="checkbox"/>	16	<input type="checkbox"/>	28	<input type="checkbox"/>	40	<input type="checkbox"/>	4	<input type="checkbox"/>	16	<input type="checkbox"/>	28	<input type="checkbox"/>	40	<input type="checkbox"/>	4	<input type="checkbox"/>	16	<input type="checkbox"/>	28	<input type="checkbox"/>	40
<input type="checkbox"/>	5	<input type="checkbox"/>	17	<input type="checkbox"/>	29	<input type="checkbox"/>	41	<input type="checkbox"/>	5	<input type="checkbox"/>	17	<input type="checkbox"/>	29	<input type="checkbox"/>	41	<input type="checkbox"/>	5	<input type="checkbox"/>	17	<input type="checkbox"/>	29	<input type="checkbox"/>	41	<input type="checkbox"/>	5	<input type="checkbox"/>	17	<input type="checkbox"/>	29	<input type="checkbox"/>	41
<input type="checkbox"/>	6	<input type="checkbox"/>	18	<input type="checkbox"/>	30	<input type="checkbox"/>	42	<input type="checkbox"/>	6	<input type="checkbox"/>	18	<input type="checkbox"/>	30	<input type="checkbox"/>	42	<input type="checkbox"/>	6	<input type="checkbox"/>	18	<input type="checkbox"/>	30	<input type="checkbox"/>	42	<input type="checkbox"/>	6	<input type="checkbox"/>	18	<input type="checkbox"/>	30	<input type="checkbox"/>	42
<input type="checkbox"/>	7	<input type="checkbox"/>	19	<input type="checkbox"/>	31	<input type="checkbox"/>	43	<input type="checkbox"/>	7	<input type="checkbox"/>	19	<input type="checkbox"/>	31	<input type="checkbox"/>	43	<input type="checkbox"/>	7	<input type="checkbox"/>	19	<input type="checkbox"/>	31	<input type="checkbox"/>	43	<input type="checkbox"/>	7	<input type="checkbox"/>	19	<input type="checkbox"/>	31	<input type="checkbox"/>	43
<input type="checkbox"/>	8	<input type="checkbox"/>	20	<input type="checkbox"/>	32	<input type="checkbox"/>	44	<input type="checkbox"/>	8	<input type="checkbox"/>	20	<input type="checkbox"/>	32	<input type="checkbox"/>	44	<input type="checkbox"/>	8	<input type="checkbox"/>	20	<input type="checkbox"/>	32	<input type="checkbox"/>	44	<input type="checkbox"/>	8	<input type="checkbox"/>	20	<input type="checkbox"/>	32	<input type="checkbox"/>	44
<input type="checkbox"/>	9	<input type="checkbox"/>	21	<input type="checkbox"/>	33	<input type="checkbox"/>	45	<input type="checkbox"/>	9	<input type="checkbox"/>	21	<input type="checkbox"/>	33	<input type="checkbox"/>	45	<input type="checkbox"/>	9	<input type="checkbox"/>	21	<input type="checkbox"/>	33	<input type="checkbox"/>	45	<input type="checkbox"/>	9	<input type="checkbox"/>	21	<input type="checkbox"/>	33	<input type="checkbox"/>	45
<input type="checkbox"/>	10	<input type="checkbox"/>	22	<input type="checkbox"/>	34	<input type="checkbox"/>	46	<input type="checkbox"/>	10	<input type="checkbox"/>	22	<input type="checkbox"/>	34	<input type="checkbox"/>	46	<input type="checkbox"/>	10	<input type="checkbox"/>	22	<input type="checkbox"/>	34	<input type="checkbox"/>	46	<input type="checkbox"/>	10	<input type="checkbox"/>	22	<input type="checkbox"/>	34	<input type="checkbox"/>	46
<input type="checkbox"/>	11	<input type="checkbox"/>	23	<input type="checkbox"/>	35	<input type="checkbox"/>	47	<input type="checkbox"/>	11	<input type="checkbox"/>	23	<input type="checkbox"/>	35	<input type="checkbox"/>	47	<input type="checkbox"/>	11	<input type="checkbox"/>	23	<input type="checkbox"/>	35	<input type="checkbox"/>	47	<input type="checkbox"/>	11	<input type="checkbox"/>	23	<input type="checkbox"/>	35	<input type="checkbox"/>	47

Start connectivity test

Stop connectivity test

Manager status: STOPPED

The original CT panel

# The new Panel

The new panel introduces a dual-view design (Test and Results) that integrates all essential tools in one place.

Instead of navigating through multiple panels, the user can now:

- Access all ODEs at a glance;
- Switch quickly between different modes;
- Instantly identify potential issues thanks to a color-coded overview.

This approach speeds up the workflow and reduces the chances of operator error.

CONNECTIVITY TEST

Q1

nODE	Test
Q1M2R11	NO
Q1M2R12	NO
Q1M2R21	NO
Q1M2R22	NO
Q1M2R23	NO
Q1M2R31	NO
Q1M2R32	NO
Q1M2R33	NO
Q1M2R34	NO
Q1M2R35	NO
Q1M2R36	NO
Q1M2R41	NO
Q1M2R42	NO
Q1M2R43	NO
Q1M2R44	NO
Q1M2R45	NO
Q1M2R46	NO
Q1M3R11	NO
Q1M3R12	NO
Q1M3R21	NO
Q1M3R22	NO
Q1M3R31	NO
Q1M3R32	NO
Q1M3R41	NO
Q1M3R42	NO
Q1M4R11	NO
Q1M4R12	NO
Q1M4R21	NO
Q1M4R31	NO
Q1M4R41	NO
Q1M5R11	NO
Q1M5R12	NO
Q1M5R21	NO
Q1M5R31	NO
Q1M5R41	NO
Q1M5R42	NO

Q2

nODE	Test
Q2M2R11	NO
Q2M2R12	NO
Q2M2R21	NO
Q2M2R22	NO
Q2M2R23	NO
Q2M2R31	NO
Q2M2R32	NO
Q2M2R33	NO
Q2M2R34	NO
Q2M2R35	NO
Q2M2R36	NO
Q2M2R41	NO
Q2M2R42	NO
Q2M2R43	NO
Q2M2R44	NO
Q2M2R45	NO
Q2M2R46	NO
Q2M3R11	NO
Q2M3R12	NO
Q2M3R21	NO
Q2M3R22	NO
Q2M3R31	NO
Q2M3R32	NO
Q2M3R41	NO
Q2M3R42	NO
Q2M4R11	NO
Q2M4R12	NO
Q2M4R21	NO
Q2M4R31	NO
Q2M4R41	NO
Q2M5R11	NO
Q2M5R12	NO
Q2M5R21	NO
Q2M5R31	NO
Q2M5R41	NO
Q2M5R42	NO

Q3

nODE	Test
Q3M2R11	NO
Q3M2R12	NO
Q3M2R21	NO
Q3M2R22	NO
Q3M2R23	NO
Q3M2R31	NO
Q3M2R32	NO
Q3M2R33	NO
Q3M2R34	NO
Q3M2R35	NO
Q3M2R36	NO
Q3M2R41	NO
Q3M2R42	NO
Q3M2R43	NO
Q3M2R44	NO
Q3M2R45	NO
Q3M2R46	NO
Q3M3R11	NO
Q3M3R12	NO
Q3M3R21	NO
Q3M3R22	NO
Q3M3R31	NO
Q3M3R32	NO
Q3M3R41	NO
Q3M3R42	NO
Q3M4R11	NO
Q3M4R12	NO
Q3M4R21	NO
Q3M4R31	NO
Q3M4R41	NO
Q3M5R11	NO
Q3M5R12	NO
Q3M5R21	NO
Q3M5R31	NO
Q3M5R41	NO
Q3M5R42	NO

Q4

nODE	Test
Q4M2R11	NO
Q4M2R12	NO
Q4M2R21	NO
Q4M2R22	NO
Q4M2R23	NO
Q4M2R31	NO
Q4M2R32	NO
Q4M2R33	NO
Q4M2R34	NO
Q4M2R35	NO
Q4M2R36	NO
Q4M2R41	NO
Q4M2R42	NO
Q4M2R43	NO
Q4M2R44	NO
Q4M2R45	NO
Q4M2R46	NO
Q4M3R11	NO
Q4M3R12	NO
Q4M3R21	NO
Q4M3R22	NO
Q4M3R31	NO
Q4M3R32	NO
Q4M3R41	NO
Q4M3R42	YES
Q4M4R11	NO
Q4M4R12	NO
Q4M4R21	NO
Q4M4R31	NO
Q4M4R41	NO
Q4M5R11	NO
Q4M5R12	NO
Q4M5R21	NO
Q4M5R31	NO
Q4M5R41	NO
Q4M5R42	NO

Remember: the NSYNC selection applies to all the ODEs

Select NSYNC channels

NSYNC\_A

<input type="checkbox"/>	0	12	24	36
<input checked="" type="checkbox"/>	1	13	25	37
<input checked="" type="checkbox"/>	2	14	26	38
<input checked="" type="checkbox"/>	3	15	27	39
<input type="checkbox"/>	4	16	28	40
<input type="checkbox"/>	5	17	29	41
<input type="checkbox"/>	6	18	30	42
<input type="checkbox"/>	7	19	31	43
<input type="checkbox"/>	8	20	32	44
<input type="checkbox"/>	9	21	33	45
<input type="checkbox"/>	10	22	34	46
<input type="checkbox"/>	11	23	35	47

NSYNC\_B

<input type="checkbox"/>	0	12	24	36
<input type="checkbox"/>	1	13	25	37
<input type="checkbox"/>	2	14	26	38
<input type="checkbox"/>	3	15	27	39
<input type="checkbox"/>	4	16	28	40
<input type="checkbox"/>	5	17	29	41
<input type="checkbox"/>	6	18	30	42
<input type="checkbox"/>	7	19	31	43
<input type="checkbox"/>	8	20	32	44
<input type="checkbox"/>	9	21	33	45
<input type="checkbox"/>	10	22	34	46
<input type="checkbox"/>	11	23	35	47

NSYNC\_C

<input type="checkbox"/>	0	12	24	36
<input type="checkbox"/>	1	13	25	37
<input type="checkbox"/>	2	14	26	38
<input type="checkbox"/>	3	15	27	39
<input type="checkbox"/>	4	16	28	40
<input type="checkbox"/>	5	17	29	41
<input type="checkbox"/>	6	18	30	42
<input type="checkbox"/>	7	19	31	43
<input type="checkbox"/>	8	20	32	44
<input type="checkbox"/>	9	21	33	45
<input type="checkbox"/>	10	22	34	46
<input type="checkbox"/>	11	23	35	47

NSYNC\_D

<input type="checkbox"/>	0	12	24	36
<input type="checkbox"/>	1	13	25	37
<input type="checkbox"/>	2	14	26	38
<input type="checkbox"/>	3	15	27	39
<input type="checkbox"/>	4	16	28	40
<input type="checkbox"/>	5	17	29	41
<input type="checkbox"/>	6	18	30	42
<input type="checkbox"/>	7	19	31	43
<input type="checkbox"/>	8	20	32	44
<input type="checkbox"/>	9	21	33	45
<input type="checkbox"/>	10	22	34	46
<input type="checkbox"/>	11	23	35	47

Start Test Stop Test Manager status: STOPPED Test View

Automatic FEB Reset: ☐

FEB Reset

Quadrant:  Station:  nSB:

I2C line:

RESET REFRESH

Muon Detector Detective

Results Analysis

Results

Not Exp. Sig. Noisy/Weak OK

Load Latest Results Noise Tolerance (%): 0

This panel's purpose is to perform and analyze the results of a Connectivity Test. More info on the test can be found on the Wiki page by double clicking on this box.

->"Test View" allows to check and change the Ode (and NSYNC) selection before starting the test

->" Load Latest Results " shows for each ODE the latest results contained in the default folder /group/muon/ConnectivityTest/ displaying the overall test result via a color that indicates:

The panel allows the operator to select between different modes depending on the stage of the test. These selectors give flexibility while maintaining a unified interface, ensuring that the same panel can serve both setup and result analysis purposes.

CONNECTIVITY TEST

Q1

nODE	Test
Q1M2R11	NO
Q1M2R12	NO
Q1M2R21	NO
Q1M2R22	NO
Q1M2R23	NO
Q1M2R31	NO
Q1M2R32	NO
Q1M2R33	NO
Q1M2R34	NO
Q1M2R35	NO
Q1M2R36	NO
Q1M2R41	NO
Q1M2R42	NO
Q1M2R43	NO
Q1M2R44	NO
Q1M2R45	NO
Q1M2R46	NO
Q1M3R11	NO
Q1M3R12	NO
Q1M3R21	NO
Q1M3R22	NO
Q1M3R31	NO
Q1M3R32	NO
Q1M3R41	NO
Q1M3R42	NO
Q1M4R11	NO
Q1M4R12	NO
Q1M4R21	NO
Q1M4R31	NO
Q1M4R41	NO
Q1M5R11	NO
Q1M5R12	NO
Q1M5R21	NO
Q1M5R31	NO
Q1M5R41	NO
Q1M5R42	NO

Q2

nODE	Test
Q2M2R11	NO
Q2M2R12	NO
Q2M2R21	NO
Q2M2R22	NO
Q2M2R23	NO
Q2M2R31	NO
Q2M2R32	NO
Q2M2R33	NO
Q2M2R34	NO
Q2M2R35	NO
Q2M2R36	NO
Q2M2R41	NO
Q2M2R42	NO
Q2M2R43	NO
Q2M2R44	NO
Q2M2R45	NO
Q2M2R46	NO
Q2M3R11	NO
Q2M3R12	NO
Q2M3R21	NO
Q2M3R22	NO
Q2M3R31	NO
Q2M3R32	NO
Q2M3R41	NO
Q2M3R42	NO
Q2M4R11	NO
Q2M4R12	NO
Q2M4R21	NO
Q2M4R31	NO
Q2M4R41	NO
Q2M5R11	NO
Q2M5R12	NO
Q2M5R21	NO
Q2M5R31	NO
Q2M5R41	NO
Q2M5R42	NO

Q3

nODE	Test
Q3M2R11	NO
Q3M2R12	NO
Q3M2R21	NO
Q3M2R22	NO
Q3M2R23	NO
Q3M2R31	NO
Q3M2R32	NO
Q3M2R33	NO
Q3M2R34	NO
Q3M2R35	NO
Q3M2R36	NO
Q3M2R41	NO
Q3M2R42	NO
Q3M2R43	NO
Q3M2R44	NO
Q3M2R45	NO
Q3M2R46	NO
Q3M3R11	NO
Q3M3R12	NO
Q3M3R21	NO
Q3M3R22	NO
Q3M3R31	NO
Q3M3R32	NO
Q3M3R41	NO
Q3M3R42	NO
Q3M4R11	NO
Q3M4R12	NO
Q3M4R21	NO
Q3M4R31	NO
Q3M4R41	NO
Q3M5R11	NO
Q3M5R12	NO
Q3M5R21	NO
Q3M5R31	NO
Q3M5R41	NO
Q3M5R42	NO

Q4

nODE	Test
Q4M2R11	NO
Q4M2R12	NO
Q4M2R21	NO
Q4M2R22	NO
Q4M2R23	NO
Q4M2R31	NO
Q4M2R32	NO
Q4M2R33	NO
Q4M2R34	NO
Q4M2R35	NO
Q4M2R36	NO
Q4M2R41	NO
Q4M2R42	NO
Q4M2R43	NO
Q4M2R44	NO
Q4M2R45	NO
Q4M2R46	NO
Q4M3R11	NO
Q4M3R12	NO
Q4M3R21	NO
Q4M3R22	NO
Q4M3R31	NO
Q4M3R32	NO
Q4M3R41	NO
Q4M3R42	YES
Q4M4R11	NO
Q4M4R12	NO
Q4M4R21	NO
Q4M4R31	NO
Q4M4R41	NO
Q4M5R11	NO
Q4M5R12	NO
Q4M5R21	NO
Q4M5R31	NO
Q4M5R41	NO
Q4M5R42	NO

Remember: the NSYNC selection applies to all the ODEs

Select NSYNC channels

NSYNC\_A

<input type="checkbox"/>	0	<input type="checkbox"/>	12	<input type="checkbox"/>	24	<input type="checkbox"/>	36
<input checked="" type="checkbox"/>	1	<input type="checkbox"/>	13	<input type="checkbox"/>	25	<input type="checkbox"/>	37
<input checked="" type="checkbox"/>	2	<input type="checkbox"/>	14	<input type="checkbox"/>	26	<input type="checkbox"/>	38
<input checked="" type="checkbox"/>	3	<input type="checkbox"/>	15	<input type="checkbox"/>	27	<input type="checkbox"/>	39
<input type="checkbox"/>	4	<input type="checkbox"/>	16	<input type="checkbox"/>	28	<input type="checkbox"/>	40
<input type="checkbox"/>	5	<input type="checkbox"/>	17	<input type="checkbox"/>	29	<input type="checkbox"/>	41
<input type="checkbox"/>	6	<input type="checkbox"/>	18	<input type="checkbox"/>	30	<input type="checkbox"/>	42
<input type="checkbox"/>	7	<input type="checkbox"/>	19	<input type="checkbox"/>	31	<input type="checkbox"/>	43
<input type="checkbox"/>	8	<input type="checkbox"/>	20	<input type="checkbox"/>	32	<input type="checkbox"/>	44
<input type="checkbox"/>	9	<input type="checkbox"/>	21	<input type="checkbox"/>	33	<input type="checkbox"/>	45
<input type="checkbox"/>	10	<input type="checkbox"/>	22	<input type="checkbox"/>	34	<input type="checkbox"/>	46
<input type="checkbox"/>	11	<input type="checkbox"/>	23	<input type="checkbox"/>	35	<input type="checkbox"/>	47

NSYNC\_B

<input type="checkbox"/>	0	<input type="checkbox"/>	12	<input type="checkbox"/>	24	<input type="checkbox"/>	36
<input type="checkbox"/>	1	<input type="checkbox"/>	13	<input type="checkbox"/>	25	<input type="checkbox"/>	37
<input type="checkbox"/>	2	<input type="checkbox"/>	14	<input type="checkbox"/>	26	<input type="checkbox"/>	38
<input type="checkbox"/>	3	<input type="checkbox"/>	15	<input type="checkbox"/>	27	<input type="checkbox"/>	39
<input type="checkbox"/>	4	<input type="checkbox"/>	16	<input type="checkbox"/>	28	<input type="checkbox"/>	40
<input type="checkbox"/>	5	<input type="checkbox"/>	17	<input type="checkbox"/>	29	<input type="checkbox"/>	41
<input type="checkbox"/>	6	<input type="checkbox"/>	18	<input type="checkbox"/>	30	<input type="checkbox"/>	42
<input type="checkbox"/>	7	<input type="checkbox"/>	19	<input type="checkbox"/>	31	<input type="checkbox"/>	43
<input type="checkbox"/>	8	<input type="checkbox"/>	20	<input type="checkbox"/>	32	<input type="checkbox"/>	44
<input type="checkbox"/>	9	<input type="checkbox"/>	21	<input type="checkbox"/>	33	<input type="checkbox"/>	45
<input type="checkbox"/>	10	<input type="checkbox"/>	22	<input type="checkbox"/>	34	<input type="checkbox"/>	46
<input type="checkbox"/>	11	<input type="checkbox"/>	23	<input type="checkbox"/>	35	<input type="checkbox"/>	47

NSYNC\_C

<input type="checkbox"/>	0	<input type="checkbox"/>	12	<input type="checkbox"/>	24	<input type="checkbox"/>	36
<input type="checkbox"/>	1	<input type="checkbox"/>	13	<input type="checkbox"/>	25	<input type="checkbox"/>	37
<input type="checkbox"/>	2	<input type="checkbox"/>	14	<input type="checkbox"/>	26	<input type="checkbox"/>	38
<input type="checkbox"/>	3	<input type="checkbox"/>	15	<input type="checkbox"/>	27	<input type="checkbox"/>	39
<input type="checkbox"/>	4	<input type="checkbox"/>	16	<input type="checkbox"/>	28	<input type="checkbox"/>	40
<input type="checkbox"/>	5	<input type="checkbox"/>	17	<input type="checkbox"/>	29	<input type="checkbox"/>	41
<input type="checkbox"/>	6	<input type="checkbox"/>	18	<input type="checkbox"/>	30	<input type="checkbox"/>	42
<input type="checkbox"/>	7	<input type="checkbox"/>	19	<input type="checkbox"/>	31	<input type="checkbox"/>	43
<input type="checkbox"/>	8	<input type="checkbox"/>	20	<input type="checkbox"/>	32	<input type="checkbox"/>	44
<input type="checkbox"/>	9	<input type="checkbox"/>	21	<input type="checkbox"/>	33	<input type="checkbox"/>	45
<input type="checkbox"/>	10	<input type="checkbox"/>	22	<input type="checkbox"/>	34	<input type="checkbox"/>	46
<input type="checkbox"/>	11	<input type="checkbox"/>	23	<input type="checkbox"/>	35	<input type="checkbox"/>	47

NSYNC\_D

<input type="checkbox"/>	0	<input type="checkbox"/>	12	<input type="checkbox"/>	24	<input type="checkbox"/>	36
<input type="checkbox"/>	1	<input type="checkbox"/>	13	<input type="checkbox"/>	25	<input type="checkbox"/>	37
<input type="checkbox"/>	2	<input type="checkbox"/>	14	<input type="checkbox"/>	26	<input type="checkbox"/>	38
<input type="checkbox"/>	3	<input type="checkbox"/>	15	<input type="checkbox"/>	27	<input type="checkbox"/>	39
<input type="checkbox"/>	4	<input type="checkbox"/>	16	<input type="checkbox"/>	28	<input type="checkbox"/>	40
<input type="checkbox"/>	5	<input type="checkbox"/>	17	<input type="checkbox"/>	29	<input type="checkbox"/>	41
<input type="checkbox"/>	6	<input type="checkbox"/>	18	<input type="checkbox"/>	30	<input type="checkbox"/>	42
<input type="checkbox"/>	7	<input type="checkbox"/>	19	<input type="checkbox"/>	31	<input type="checkbox"/>	43
<input type="checkbox"/>	8	<input type="checkbox"/>	20	<input type="checkbox"/>	32	<input type="checkbox"/>	44
<input type="checkbox"/>	9	<input type="checkbox"/>	21	<input type="checkbox"/>	33	<input type="checkbox"/>	45
<input type="checkbox"/>	10	<input type="checkbox"/>	22	<input type="checkbox"/>	34	<input type="checkbox"/>	46
<input type="checkbox"/>	11	<input type="checkbox"/>	23	<input type="checkbox"/>	35	<input type="checkbox"/>	47

Start Test
Stop Test
Manager status: STOPPED
Test View

Automatic FEB Reset: ☐

FEB Reset

Quadrant
Station
nSB
I2C line

RESET
REFRESH

Muon Detector Detective
Results Analysis

Results

☐ Not Exp. Sig.
☐ Noisy/Weak
☒ OK

Load Latest Results
Noise Tolerance (%): 0

This panel's purpose is to perform and analyze the results of a Connectivity Test. More info on the test can be found on the Wiki page by double clicking on this box.

->"Test View" allows to check and change the Ode (and NSYNC) selection before starting the test
->" Load Latest Results " shows for each ODE the latest results contained in the default folder group/muon/ConnectivityTest/ displaying the overall test result via a color that indicates:

Mode Selectors

8 of 15



# Test View

Automatic FEB  
Reset (Testing)

CONNECTIVITY TEST

Q1

nODE	Test
Q1M2R11	NO
Q1M2R12	NO
Q1M2R21	NO
Q1M2R22	NO
Q1M2R23	NO
Q1M2R31	NO
Q1M2R32	NO
Q1M2R33	NO
Q1M2R34	NO
Q1M2R35	NO
Q1M2R36	NO
Q1M2R41	NO
Q1M2R42	NO
Q1M2R43	NO
Q1M2R44	NO
Q1M2R45	NO
Q1M2R46	NO
Q1M3R11	NO
Q1M3R12	NO
Q1M3R21	NO
Q1M3R22	NO
Q1M3R31	NO
Q1M3R32	NO
Q1M3R41	NO
Q1M3R42	NO
Q1M4R11	NO
Q1M4R12	NO
Q1M4R21	NO
Q1M4R31	NO
Q1M4R41	NO
Q1M5R11	NO
Q1M5R12	NO
Q1M5R21	NO
Q1M5R31	NO
Q1M5R41	NO
Q1M5R42	NO

Q2

nODE	Test
Q2M2R11	NO
Q2M2R12	NO
Q2M2R21	NO
Q2M2R22	NO
Q2M2R23	NO
Q2M2R31	NO
Q2M2R32	NO
Q2M2R33	NO
Q2M2R34	NO
Q2M2R35	NO
Q2M2R36	NO
Q2M2R41	NO
Q2M2R42	NO
Q2M2R43	NO
Q2M2R44	NO
Q2M2R45	NO
Q2M2R46	NO
Q2M3R11	NO
Q2M3R12	NO
Q2M3R21	NO
Q2M3R22	NO
Q2M3R31	NO
Q2M3R32	NO
Q2M3R41	NO
Q2M3R42	NO
Q2M4R11	NO
Q2M4R12	NO
Q2M4R21	NO
Q2M4R31	NO
Q2M4R41	NO
Q2M5R11	NO
Q2M5R12	NO
Q2M5R21	NO
Q2M5R31	NO
Q2M5R41	NO
Q2M5R42	NO

Q3

nODE	Test
Q3M2R11	NO
Q3M2R12	NO
Q3M2R21	NO
Q3M2R22	NO
Q3M2R23	NO
Q3M2R31	NO
Q3M2R32	NO
Q3M2R33	NO
Q3M2R34	NO
Q3M2R35	NO
Q3M2R36	NO
Q3M2R41	NO
Q3M2R42	NO
Q3M2R43	NO
Q3M2R44	NO
Q3M2R45	NO
Q3M2R46	YES
Q3M3R11	NO
Q3M3R12	NO
Q3M3R21	NO
Q3M3R22	NO
Q3M3R31	NO
Q3M3R32	NO
Q3M3R41	NO
Q3M3R42	NO
Q3M4R11	NO
Q3M4R12	NO
Q3M4R21	NO
Q3M4R31	NO
Q3M4R41	NO
Q3M5R11	NO
Q3M5R12	NO
Q3M5R21	NO
Q3M5R31	NO
Q3M5R41	NO
Q3M5R42	NO

Q4

nODE	Test
Q4M2R11	NO
Q4M2R12	NO
Q4M2R21	NO
Q4M2R22	NO
Q4M2R23	NO
Q4M2R31	NO
Q4M2R32	NO
Q4M2R33	NO
Q4M2R34	NO
Q4M2R35	NO
Q4M2R36	NO
Q4M2R41	NO
Q4M2R42	NO
Q4M2R43	NO
Q4M2R44	NO
Q4M2R45	NO
Q4M2R46	NO
Q4M3R11	NO
Q4M3R12	NO
Q4M3R21	NO
Q4M3R22	NO
Q4M3R31	NO
Q4M3R32	NO
Q4M3R41	NO
Q4M3R42	NO
Q4M4R11	NO
Q4M4R12	NO
Q4M4R21	NO
Q4M4R31	NO
Q4M4R41	NO
Q4M5R11	NO
Q4M5R12	NO
Q4M5R21	NO
Q4M5R31	NO
Q4M5R41	NO
Q4M5R42	NO

Remember: the NSYNC selection applies to all the ODEs

Select NSYNC channels

NSYNC\_A

<input type="checkbox"/>	0	<input type="checkbox"/>	12	<input type="checkbox"/>	24	<input type="checkbox"/>	36
<input checked="" type="checkbox"/>	1	<input type="checkbox"/>	13	<input type="checkbox"/>	25	<input type="checkbox"/>	37
<input checked="" type="checkbox"/>	2	<input type="checkbox"/>	14	<input type="checkbox"/>	26	<input type="checkbox"/>	38
<input checked="" type="checkbox"/>	3	<input type="checkbox"/>	15	<input type="checkbox"/>	27	<input type="checkbox"/>	39
<input type="checkbox"/>	4	<input type="checkbox"/>	16	<input type="checkbox"/>	28	<input type="checkbox"/>	40
<input type="checkbox"/>	5	<input type="checkbox"/>	17	<input type="checkbox"/>	29	<input type="checkbox"/>	41
<input type="checkbox"/>	6	<input type="checkbox"/>	18	<input type="checkbox"/>	30	<input type="checkbox"/>	42
<input type="checkbox"/>	7	<input type="checkbox"/>	19	<input type="checkbox"/>	31	<input type="checkbox"/>	43
<input type="checkbox"/>	8	<input type="checkbox"/>	20	<input type="checkbox"/>	32	<input type="checkbox"/>	44
<input type="checkbox"/>	9	<input type="checkbox"/>	21	<input type="checkbox"/>	33	<input type="checkbox"/>	45
<input type="checkbox"/>	10	<input type="checkbox"/>	22	<input type="checkbox"/>	34	<input type="checkbox"/>	46
<input type="checkbox"/>	11	<input type="checkbox"/>	23	<input type="checkbox"/>	35	<input type="checkbox"/>	47

NSYNC\_B

<input type="checkbox"/>	0	<input type="checkbox"/>	12	<input type="checkbox"/>	24	<input type="checkbox"/>	36
<input type="checkbox"/>	1	<input type="checkbox"/>	13	<input type="checkbox"/>	25	<input type="checkbox"/>	37
<input type="checkbox"/>	2	<input type="checkbox"/>	14	<input type="checkbox"/>	26	<input type="checkbox"/>	38
<input type="checkbox"/>	3	<input type="checkbox"/>	15	<input type="checkbox"/>	27	<input type="checkbox"/>	39
<input type="checkbox"/>	4	<input type="checkbox"/>	16	<input type="checkbox"/>	28	<input type="checkbox"/>	40
<input type="checkbox"/>	5	<input type="checkbox"/>	17	<input type="checkbox"/>	29	<input type="checkbox"/>	41
<input type="checkbox"/>	6	<input type="checkbox"/>	18	<input type="checkbox"/>	30	<input type="checkbox"/>	42
<input type="checkbox"/>	7	<input type="checkbox"/>	19	<input type="checkbox"/>	31	<input type="checkbox"/>	43
<input type="checkbox"/>	8	<input type="checkbox"/>	20	<input type="checkbox"/>	32	<input type="checkbox"/>	44
<input type="checkbox"/>	9	<input type="checkbox"/>	21	<input type="checkbox"/>	33	<input type="checkbox"/>	45
<input type="checkbox"/>	10	<input type="checkbox"/>	22	<input type="checkbox"/>	34	<input type="checkbox"/>	46
<input type="checkbox"/>	11	<input type="checkbox"/>	23	<input type="checkbox"/>	35	<input type="checkbox"/>	47

NSYNC\_C

<input type="checkbox"/>	0	<input type="checkbox"/>	12	<input type="checkbox"/>	24	<input type="checkbox"/>	36
<input type="checkbox"/>	1	<input type="checkbox"/>	13	<input type="checkbox"/>	25	<input type="checkbox"/>	37
<input type="checkbox"/>	2	<input type="checkbox"/>	14	<input type="checkbox"/>	26	<input type="checkbox"/>	38
<input type="checkbox"/>	3	<input type="checkbox"/>	15	<input type="checkbox"/>	27	<input type="checkbox"/>	39
<input type="checkbox"/>	4	<input type="checkbox"/>	16	<input type="checkbox"/>	28	<input type="checkbox"/>	40
<input type="checkbox"/>	5	<input type="checkbox"/>	17	<input type="checkbox"/>	29	<input type="checkbox"/>	41
<input type="checkbox"/>	6	<input type="checkbox"/>	18	<input type="checkbox"/>	30	<input type="checkbox"/>	42
<input type="checkbox"/>	7	<input type="checkbox"/>	19	<input type="checkbox"/>	31	<input type="checkbox"/>	43
<input type="checkbox"/>	8	<input type="checkbox"/>	20	<input type="checkbox"/>	32	<input type="checkbox"/>	44
<input type="checkbox"/>	9	<input type="checkbox"/>	21	<input type="checkbox"/>	33	<input type="checkbox"/>	45
<input type="checkbox"/>	10	<input type="checkbox"/>	22	<input type="checkbox"/>	34	<input type="checkbox"/>	46
<input type="checkbox"/>	11	<input type="checkbox"/>	23	<input type="checkbox"/>	35	<input type="checkbox"/>	47

NSYNC\_D

<input type="checkbox"/>	0	<input type="checkbox"/>	12	<input type="checkbox"/>	24	<input type="checkbox"/>	36
<input type="checkbox"/>	1	<input type="checkbox"/>	13	<input type="checkbox"/>	25	<input type="checkbox"/>	37
<input type="checkbox"/>	2	<input type="checkbox"/>	14	<input type="checkbox"/>	26	<input type="checkbox"/>	38
<input type="checkbox"/>	3	<input type="checkbox"/>	15	<input type="checkbox"/>	27	<input type="checkbox"/>	39
<input type="checkbox"/>	4	<input type="checkbox"/>	16	<input type="checkbox"/>	28	<input type="checkbox"/>	40
<input type="checkbox"/>	5	<input type="checkbox"/>	17	<input type="checkbox"/>	29	<input type="checkbox"/>	41
<input type="checkbox"/>	6	<input type="checkbox"/>	18	<input type="checkbox"/>	30	<input type="checkbox"/>	42
<input type="checkbox"/>	7	<input type="checkbox"/>	19	<input type="checkbox"/>	31	<input type="checkbox"/>	43
<input type="checkbox"/>	8	<input type="checkbox"/>	20	<input type="checkbox"/>	32	<input type="checkbox"/>	44
<input type="checkbox"/>	9	<input type="checkbox"/>	21	<input type="checkbox"/>	33	<input type="checkbox"/>	45
<input type="checkbox"/>	10	<input type="checkbox"/>	22	<input type="checkbox"/>	34	<input type="checkbox"/>	46
<input type="checkbox"/>	11	<input type="checkbox"/>	23	<input type="checkbox"/>	35	<input type="checkbox"/>	47

Start Test

Stop Test

Manager status: STOPPED

Automatic FEB Reset: ☐

Test View

Results

☐ Not Exp. Sig.

☐ Noisy/Weak

☒ OK

Load Latest Results

Noise Tolerance (%): 0

ODE selector

NSYNC selector

In the Test View, the user can choose which ODEs to test. This view also integrates an automatic FEB reset option (currently under development), aimed at ensuring that each board starts in a clean state before the test begins.

# Result View

By clicking on any ODE result, the user can open the detailed Result Analysis panel for deeper inspection.

The test's results are written in a file for each ODE. This view shows latest ODE test files. Each ODE is color-coded according to the overall health of its channels, providing a quick, intuitive snapshot of the system status.

CONNECTIVITY TEST

Q1

nODE	Latest Res.
Q1M2R11	2025.9.1 11:13:24
Q1M2R12	2025.2.27 12:16:0
Q1M2R21	2025.2.27 12:58:41
Q1M2R22	2025.2.27 13:52:22
Q1M2R23	2025.2.27 14:46:12
Q1M2R31	2025.2.27 15:39:59
Q1M2R32	2025.2.27 16:28:51
Q1M2R33	2025.2.27 17:17:35
Q1M2R34	2025.2.27 18:6:27
Q1M2R35	2025.2.27 18:55:6
Q1M2R36	2025.2.27 19:43:42
Q1M2R41	2025.2.27 20:32:16
Q1M2R42	2025.2.27 21:20:43
Q1M2R43	2025.2.27 22:9:32
Q1M2R44	2025.2.27 22:57:51
Q1M2R45	2025.2.27 23:46:40
Q1M2R46	2025.2.28 0:35:27
Q1M3R11	2025.2.28 1:24:23
Q1M3R12	2025.2.28 2:7:2
Q1M3R21	2025.2.28 2:49:48
Q1M3R22	2025.2.28 4:8:9
Q1M3R31	2025.2.28 5:26:26
Q1M3R32	2025.2.28 9:35:37
Q1M3R41	2025.2.28 13:44:33
Q1M3R42	2025.2.28 17:53:17
Q1M4R11	2025.2.28 22:1:53
Q1M4R12	2025.2.28 22:50:43
Q1M4R21	2025.2.28 23:16:1
Q1M4R31	2025.3.1 1:24:23
Q1M4R41	2025.3.1 5:26:17
Q1M5R11	2025.3.1 13:18:34
Q1M5R12	2025.3.1 14:7:0
Q1M5R21	2025.3.1 14:32:8
Q1M5R31	2025.3.1 16:39:49
Q1M5R41	2025.3.1 20:41:20
Q1M5R42	2025.3.1 22:45:7

Q2

nODE	Latest Res.
Q2M2R11	2025.9.1 11:47:43
Q2M2R12	2025.3.3 22:0:56
Q2M2R21	2025.3.3 22:43:32
Q2M2R22	2025.3.3 23:36:59
Q2M2R23	2025.3.4 0:30:19
Q2M2R31	2025.3.4 1:23:49
Q2M2R32	2025.3.4 2:12:15
Q2M2R33	2025.3.4 3:49:1
Q2M2R34	2025.3.4 3:0:37
Q2M2R35	2025.3.4 4:37:29
Q2M2R36	2025.3.4 5:25:47
Q2M2R41	2025.3.4 6:14:10
Q2M2R42	2025.3.4 7:2:37
Q2M2R43	2025.3.4 7:51:1
Q2M2R44	2025.3.4 8:39:17
Q2M2R45	2025.3.4 9:27:40
Q2M2R46	2025.3.4 10:15:57
Q2M3R11	2025.9.1 11:59:7
Q2M3R12	2025.3.4 11:46:42
Q2M3R21	2025.3.4 12:29:4
Q2M3R22	2025.3.4 13:46:45
Q2M3R31	2025.3.4 19:11:10
Q2M3R32	2025.3.4 15:4:4
Q2M3R41	2025.3.4 23:18:47
Q2M3R42	2025.3.5 3:25:29
Q2M4R11	2025.3.5 7:12:14
Q2M4R12	2025.3.5 7:27:7
Q2M4R21	2025.3.5 8:40:29
Q2M4R31	2025.3.5 10:47:47
Q2M4R41	2025.3.5 14:47:34
Q2M5R11	2025.3.5 22:37:52
Q2M5R12	2025.3.5 23:26:39
Q2M5R21	2025.3.6 0:51:1
Q2M5R31	2025.3.6 2:0:51
Q2M5R41	2025.3.6 6:2:13
Q2M5R42	2025.3.6 8:4:57

Q3

nODE	Latest Res.
Q3M2R11	2025.2.24 16:26:4
Q3M2R12	2025.2.24 17:7:43
Q3M2R21	2025.2.24 17:49:33
Q3M2R22	2025.2.24 19:35:12
Q3M2R23	2025.2.24 18:42:27
Q3M2R31	2025.2.24 20:28:0
Q3M2R32	2025.2.24 21:15:56
Q3M2R33	2025.2.24 22:3:43
Q3M2R34	2025.2.24 22:51:44
Q3M2R35	2025.2.24 23:39:30
Q3M2R36	2025.2.25 0:27:24
Q3M2R41	2025.2.25 2:2:57
Q3M2R42	2025.2.25 1:15:17
Q3M2R43	2025.2.25 2:50:49
Q3M2R44	2025.2.25 3:38:35
Q3M2R45	2025.2.25 4:26:20
Q3M2R46	2025.2.25 5:14:16
Q3M3R11	2025.2.25 6:2:8
Q3M3R12	2025.2.25 6:43:42
Q3M3R21	2025.2.25 7:25:50
Q3M3R22	2025.2.25 8:42:25
Q3M3R31	2025.2.25 9:59:0
Q3M3R32	2025.2.25 14:2:18
Q3M3R41	2025.2.25 18:5:16
Q3M3R42	2025.2.27 11:55:50
Q3M4R11	2025.2.19 14:22:43
Q3M4R12	2025.2.26 2:59:55
Q3M4R21	2025.2.26 3:24:48
Q3M4R31	2025.2.26 5:30:36
Q3M4R41	2025.2.26 6:28:16
Q3M5R11	2025.2.26 17:36:9
Q3M5R12	2025.2.26 17:11:11
Q3M5R21	2025.2.26 18:23:53
Q3M5R31	2025.2.26 20:29:18
Q3M5R41	2025.2.27 0:26:38
Q3M5R42	2025.2.27 2:27:54

Q4

nODE	Latest Res.
Q4M2R11	2025.9.11 17:20:1
Q4M2R12	2025.2.17 15:10:35
Q4M2R21	2025.2.17 15:54:29
Q4M2R22	2025.2.17 16:49:23
Q4M2R23	2025.2.17 17:44:20
Q4M2R31	2025.2.17 13:37:3
Q4M2R32	2025.2.17 18:39:12
Q4M2R33	2025.2.17 19:28:56
Q4M2R34	2025.2.17 20:18:39
Q4M2R35	2025.2.17 21:8:20
Q4M2R36	2025.2.17 21:58:13
Q4M2R41	2025.2.17 22:47:37
Q4M2R42	2025.2.17 23:37:23
Q4M2R43	2025.2.18 0:27:12
Q4M2R44	2025.2.18 1:17:4
Q4M2R45	2025.2.18 2:6:54
Q4M2R46	2025.2.18 2:56:37
Q4M3R11	2025.2.18 17:19:11
Q4M3R12	2025.2.18 18:2:56
Q4M3R21	2025.2.18 18:46:46
Q4M3R22	2025.2.18 20:6:19
Q4M3R31	2025.2.18 21:26:9
Q4M3R32	2025.2.19 1:40:2
Q4M3R41	2025.2.19 5:54:34
Q4M3R42	2025.2.19 10:8:53
Q4M4R11	2025.2.19 14:22:43
Q4M4R12	2025.2.19 15:10:56
Q4M4R21	2025.2.19 15:36:35
Q4M4R31	2025.2.19 17:47:27
Q4M4R41	2025.2.19 21:54:56
Q4M5R11	2025.2.20 5:57:41
Q4M5R12	2025.2.20 6:47:20
Q4M5R21	2025.2.20 7:13:12
Q4M5R31	2025.2.20 9:24:15
Q4M5R41	2025.2.20 13:31:10
Q4M5R42	2025.2.20 13:36:16

Remember: the NSYNC selection applies to all the ODEs

Select NSYNC channels

NSYNC\_A

<input checked="" type="checkbox"/>	0	12	24	36
<input checked="" type="checkbox"/>	1	13	25	37
<input checked="" type="checkbox"/>	2	14	26	38
<input checked="" type="checkbox"/>	3	15	27	39
<input type="checkbox"/>	4	16	28	40
<input type="checkbox"/>	5	17	29	41
<input type="checkbox"/>	6	18	30	42
<input type="checkbox"/>	7	19	31	43
<input type="checkbox"/>	8	20	32	44
<input type="checkbox"/>	9	21	33	45
<input type="checkbox"/>	10	22	34	46
<input type="checkbox"/>	11	23	35	47

NSYNC\_B

<input type="checkbox"/>	0	12	24	36
<input type="checkbox"/>	1	13	25	37
<input type="checkbox"/>	2	14	26	38
<input type="checkbox"/>	3	15	27	39
<input type="checkbox"/>	4	16	28	40
<input type="checkbox"/>	5	17	29	41
<input type="checkbox"/>	6	18	30	42
<input type="checkbox"/>	7	19	31	43
<input type="checkbox"/>	8	20	32	44
<input type="checkbox"/>	9	21	33	45
<input type="checkbox"/>	10	22	34	46
<input type="checkbox"/>	11	23	35	47

NSYNC\_C

<input type="checkbox"/>	0	12	24	36
<input type="checkbox"/>	1	13	25	37
<input type="checkbox"/>	2	14	26	38
<input type="checkbox"/>	3	15	27	39
<input type="checkbox"/>	4	16	28	40
<input type="checkbox"/>	5	17	29	41
<input type="checkbox"/>	6	18	30	42
<input type="checkbox"/>	7	19	31	43
<input type="checkbox"/>	8	20	32	44
<input type="checkbox"/>	9	21	33	45
<input type="checkbox"/>	10	22	34	46
<input type="checkbox"/>	11	23	35	47

NSYNC\_D

<input type="checkbox"/>	0	12	24	36
<input type="checkbox"/>	1	13	25	37
<input type="checkbox"/>	2	14	26	38
<input type="checkbox"/>	3	15	27	39
<input type="checkbox"/>	4	16	28	40
<input type="checkbox"/>	5	17	29	41
<input type="checkbox"/>	6	18	30	42
<input type="checkbox"/>	7	19	31	43
<input type="checkbox"/>	8	20	32	44
<input type="checkbox"/>	9	21	33	45
<input type="checkbox"/>	10	22	34	46
<input type="checkbox"/>	11	23	35	47

Results

☒ Not Exp. Sig.

☒ OK

☐ Noisy/Weak

Load Latest Results

Noise Tolerance (%) : 0

Start Test

Stop Test

Manager status: STOPPED

Test View

Automatic FEB Reset: ☐

FEB Reset

Quadrant

Station

nSB

I2C line

RESET

REFRESH

Muon Detector Detective

Results Analysis

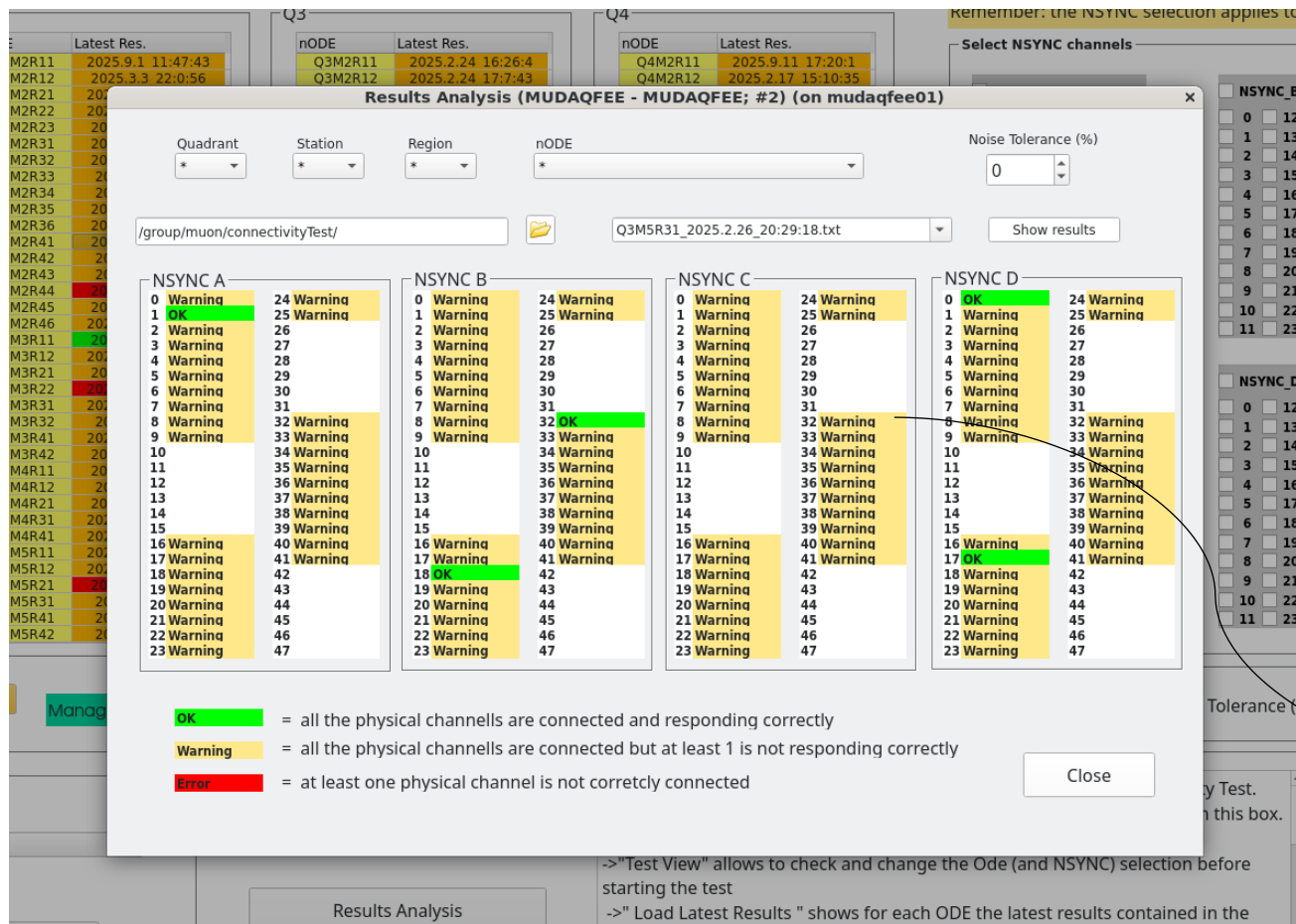
This panel's purpose is to perform and analyze the results of a Connectivity Test. More info on the test can be found on the Wiki page by double clicking on this box.

->"Test View" allows to check and change the Ode (and NSYNC) selection before starting the test

->" Load Latest Results " shows for each ODE the latest results contained in the default folder /group/muon/ConnectivityTest/ displaying the overall test result via a color that indicates:

Previously done offline using a Python script.

10 of 15



Each logical channel is color-coded based on its performance, making it easy to identify problematic areas immediately.

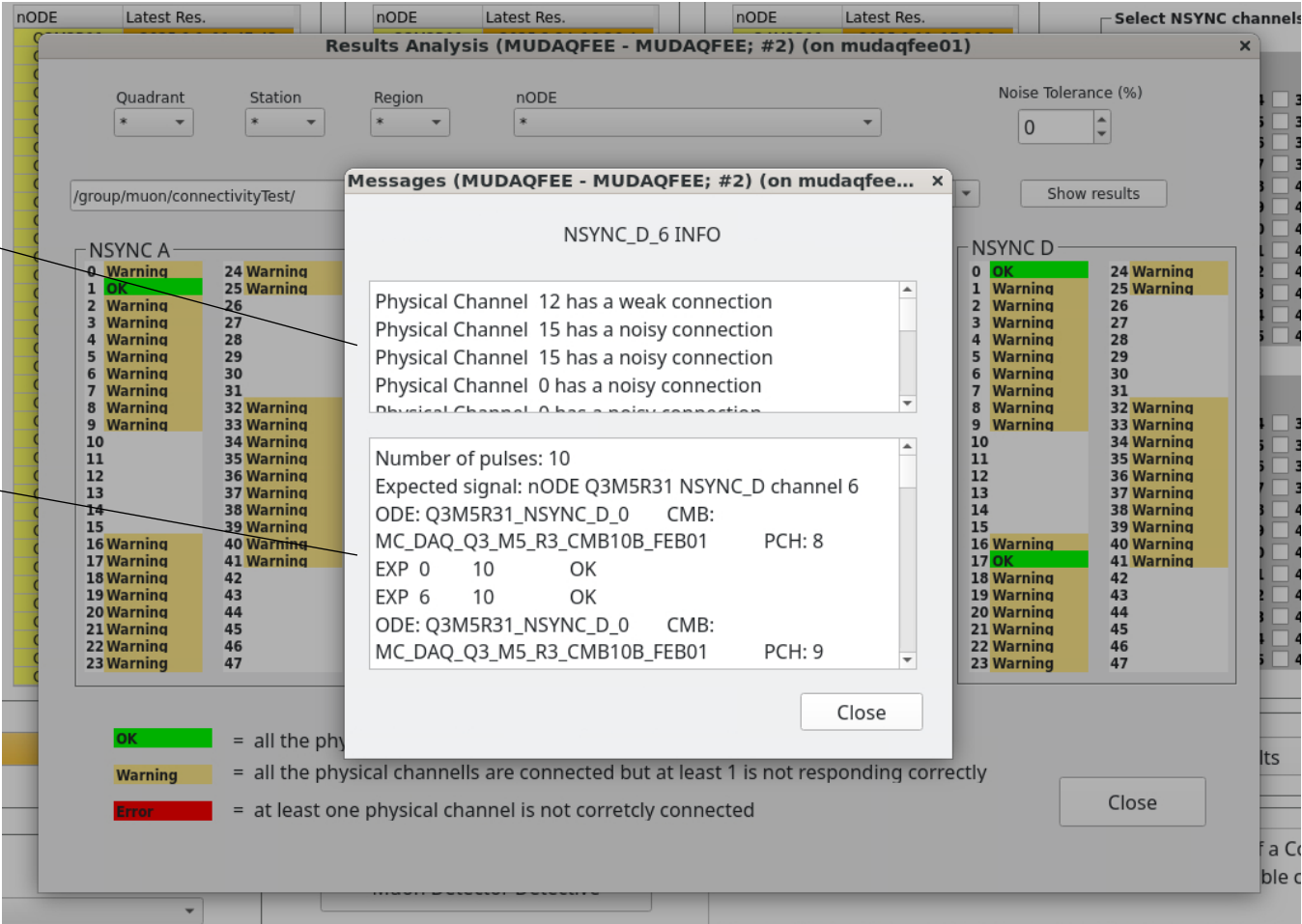
This panel (evolution of the already started “res” panel) provides a detailed visualization of the test results for a single ODE. By focusing on individual channels, the operator can precisely diagnose whether issues are due to noise, weak signals, or faulty connections.

## Result Analysis Panel

# Channel Analysis Panel

Automatic error and warning messages for each channel, helping the operator interpret the raw information quickly and accurately.

Original Test Results from the file to make troubleshooting more efficient and reduce the need for manual log-checking.





# Noise Tolerance

A major challenge in the Connectivity Test is distinguishing genuine connection problems from fluctuations caused by electronic noise. To address this, we use a Noise Tolerance selector, already present in the original Python Script. This feature allows the operator to tune the sensitivity of the test, filtering out channels that are only slightly noisy or weak.

CONNECTIVITY TEST

Q1

nODE	Latest Res.
Q1M2R11	2025.9.11 11:13:24
Q1M2R12	2025.2.27 12:16:0
Q1M2R21	2025.2.27 12:58:41
Q1M2R22	2025.2.27 13:52:22
Q1M2R23	2025.2.27 14:46:12
Q1M2R31	2025.2.27 15:39:59
Q1M2R32	2025.2.27 16:28:51
Q1M2R33	2025.2.27 17:17:35
Q1M2R34	2025.2.27 18:6:27
Q1M2R35	2025.2.27 18:55:6
Q1M2R36	2025.2.27 19:43:42
Q1M2R41	2025.2.27 20:32:16
Q1M2R42	2025.2.27 21:20:43
Q1M2R43	2025.2.27 22:9:32
Q1M2R44	2025.2.27 22:57:51
Q1M2R45	2025.2.27 23:46:40
Q1M2R46	2025.2.28 0:35:27
Q1M3R11	2025.2.28 1:24:8
Q1M3R12	2025.2.28 2:7:2
Q1M3R21	2025.2.28 2:49:48
Q1M3R22	2025.2.28 4:8:9
Q1M3R31	2025.2.28 5:76:26
Q1M3R32	2025.2.28 9:35:37
Q1M3R41	2025.2.28 13:44:33
Q1M3R42	2025.2.28 17:53:17
Q1M4R11	2025.2.28 22:1:53
Q1M4R12	2025.2.28 22:50:43
Q1M4R21	2025.2.28 23:16:1
Q1M4R31	2025.3.1 1:24:23
Q1M4R41	2025.3.1 5:26:17
Q1M5R11	2025.3.1 13:18:34
Q1M5R12	2025.3.1 14:7:0
Q1M5R21	2025.3.1 14:32:8
Q1M5R31	2025.3.1 16:39:49
Q1M5R41	2025.3.1 20:41:20
Q1M5R42	2025.3.1 22:45:7

Q2

nODE	Latest Res.
Q2M2R11	2025.9.11 11:47:43
Q2M2R12	2025.3.3 22:0:56
Q2M2R21	2025.3.3 22:43:32
Q2M2R22	2025.3.3 23:36:59
Q2M2R23	2025.3.4 0:30:19
Q2M2R31	2025.3.4 1:23:49
Q2M2R32	2025.3.4 2:12:15
Q2M2R33	2025.3.4 3:49:1
Q2M2R34	2025.3.4 3:0:37
Q2M2R35	2025.3.4 4:37:29
Q2M2R36	2025.3.4 5:25:47
Q2M2R41	2025.3.4 6:14:10
Q2M2R42	2025.3.4 7:2:37
Q2M2R43	2025.3.4 7:51:1
Q2M2R44	2025.3.4 8:39:47
Q2M2R45	2025.3.4 9:27:40
Q2M2R46	2025.3.4 10:15:57
Q2M3R11	2025.9.11 11:59:7
Q2M3R12	2025.3.4 11:46:42
Q2M3R21	2025.3.4 12:29:4
Q2M3R22	2025.3.4 13:46:45
Q2M3R31	2025.3.4 19:11:10
Q2M3R32	2025.3.4 15:4:4
Q2M3R41	2025.3.4 23:18:47
Q2M3R42	2025.3.5 3:25:29
Q2M4R11	2025.3.5 7:52:14
Q2M4R12	2025.3.5 7:27:7
Q2M4R21	2025.3.5 8:40:29
Q2M4R31	2025.3.5 10:47:47
Q2M4R41	2025.3.5 14:47:34
Q2M5R11	2025.3.5 22:37:52
Q2M5R12	2025.3.5 23:26:39
Q2M5R21	2025.3.5 23:52:2
Q2M5R31	2025.3.6 2:0:51
Q2M5R41	2025.3.6 6:2:13
Q2M5R42	2025.3.6 8:4:57

Q3

nODE	Latest Res.
Q3M2R11	2025.2.24 16:26:4
Q3M2R12	2025.2.24 17:7:43
Q3M2R21	2025.2.24 17:49:33
Q3M2R22	2025.2.24 19:35:12
Q3M2R23	2025.2.24 18:42:27
Q3M2R31	2025.2.24 20:28:0
Q3M2R32	2025.2.24 21:15:56
Q3M2R33	2025.2.24 22:3:43
Q3M2R34	2025.2.24 22:51:44
Q3M2R35	2025.2.24 23:39:30
Q3M2R36	2025.2.25 0:27:24
Q3M2R41	2025.2.25 2:5:57
Q3M2R42	2025.2.25 1:15:17
Q3M2R43	2025.2.25 2:50:49
Q3M2R44	2025.2.25 3:38:35
Q3M2R45	2025.2.25 4:26:20
Q3M2R46	2025.2.25 5:14:16
Q3M3R11	2025.2.25 6:2:8
Q3M3R12	2025.2.25 6:43:42
Q3M3R21	2025.2.25 7:25:50
Q3M3R22	2025.2.25 8:42:25
Q3M3R31	2025.2.25 9:59:0
Q3M3R32	2025.2.25 14:2:18
Q3M3R41	2025.2.25 18:5:16
Q3M3R42	2025.2.27 11:55:50
Q3M4R11	2025.2.26 2:12:14
Q3M4R12	2025.2.26 2:59:55
Q3M4R21	2025.2.26 3:24:48
Q3M4R31	2025.2.26 5:30:36
Q3M4R41	2025.2.26 6:18:41
Q3M5R11	2025.2.26 17:36:9
Q3M5R12	2025.2.26 17:11:11
Q3M5R21	2025.2.26 18:23:53
Q3M5R31	2025.2.26 20:29:18
Q3M5R41	2025.2.27 0:26:38
Q3M5R42	2025.2.27 2:27:54

Q4

nODE	Latest Res.
Q4M2R11	2025.9.11 17:20:1
Q4M2R12	2025.2.17 15:10:35
Q4M2R21	2025.2.17 15:54:29
Q4M2R22	2025.2.17 16:49:23
Q4M2R23	2025.2.17 17:44:20
Q4M2R31	2025.2.17 13:37:3
Q4M2R32	2025.2.17 18:39:12
Q4M2R33	2025.2.17 19:28:56
Q4M2R34	2025.2.17 20:18:39
Q4M2R35	2025.2.17 21:8:20
Q4M2R36	2025.2.17 21:58:13
Q4M2R41	2025.2.17 22:47:37
Q4M2R42	2025.2.17 23:37:23
Q4M2R43	2025.2.18 0:27:12
Q4M2R44	2025.2.18 1:17:4
Q4M2R45	2025.2.18 2:6:54
Q4M2R46	2025.2.18 2:56:37
Q4M3R11	2025.2.18 17:19:11
Q4M3R12	2025.2.18 18:2:56
Q4M3R21	2025.2.18 18:46:46
Q4M3R22	2025.2.18 20:6:19
Q4M3R31	2025.2.18 21:46:4
Q4M3R32	2025.2.19 1:40:2
Q4M3R41	2025.2.19 5:54:34
Q4M3R42	2025.2.19 10:8:53
Q4M4R11	2025.2.19 14:22:43
Q4M4R12	2025.2.19 15:10:56
Q4M4R21	2025.2.19 15:36:35
Q4M4R31	2025.2.19 17:47:27
Q4M4R41	2025.2.19 18:4:41
Q4M5R11	2025.2.20 5:57:41
Q4M5R12	2025.2.20 6:47:20
Q4M5R21	2025.2.20 7:13:12
Q4M5R31	2025.2.20 9:24:15
Q4M5R41	2025.2.20 10:1:44
Q4M5R42	2025.9.11 17:16:46

Remember: the NSYNC selection applies to all the ODEs

Select NSYNC channels

NSYNC\_A

0	12	24	36
1	13	25	37
2	14	26	38
3	15	27	39
4	16	28	40
5	17	29	41
6	18	30	42
7	19	31	43
8	20	32	44
9	21	33	45
10	22	34	46
11	23	35	47

NSYNC\_B

0	12	24	36
1	13	25	37
2	14	26	38
3	15	27	39
4	16	28	40
5	17	29	41
6	18	30	42
7	19	31	43
8	20	32	44
9	21	33	45
10	22	34	46
11	23	35	47

NSYNC\_C

0	12	24	36
1	13	25	37
2	14	26	38
3	15	27	39
4	16	28	40
5	17	29	41
6	18	30	42
7	19	31	43
8	20	32	44
9	21	33	45
10	22	34	46
11	23	35	47

NSYNC\_D

0	12	24	36
1	13	25	37
2	14	26	38
3	15	27	39
4	16	28	40
5	17	29	41
6	18	30	42
7	19	31	43
8	20	32	44
9	21	33	45
10	22	34	46
11	23	35	47

Results

Not Exp. Sig.

Noisy/Weak

OK

Load Latest Results

Noise Tolerance (%) : 0

Start Test

Stop Test

Manager status: STOPPED

Test View

Automatic FEB Reset: ☐

FEB Reset

Quadrant

Station

nSB

I2C line

RESET

REFRESH

Muon Detector Detective

Results Analysis

This panel's purpose is to perform and analyze the results of a Connectivity Test. More info on the test can be found on the Wiki page by double clicking on this box.

->"Test View" allows to check and change the Ode (and NSYNC) selection before starting the test

->"Load Latest Results" shows for each ODE the latest results contained in the default folder /group/muon/ConnectivityTest/ displaying the overall test result via a color that indicates:

Latest Res.

2025.9.11 17:20:1

2025.2.17 15:10:35

Remember: the NSYNC selection applies to

Select NSYNC channels

Noise Tolerance (%)

0

Show results

FE; #2) (on mudaqfee01)

NSYNC\_B

0	12
1	13
2	14
3	15
4	16
5	17
6	18
7	19
8	20
9	21
10	22
11	23

NSYNC\_C

24	Warning
25	Warning
26	Warning
27	Warning
28	Warning
29	Warning
30	Warning
31	Warning
32	Warning
33	Warning

NSYNC\_D

0	OK
1	Warning
2	Warning
3	Warning
4	Warning
5	Warning
6	Warning
7	Warning
8	Warning
9	Warning
24	Warning
25	Warning
26	Warning
27	Warning
28	Warning
29	Warning
30	Warning
31	Warning
32	Warning
33	Warning



The finished panel is already available on the MUDAQFEE project and represents a starting point for future improvements.

The next steps aim at making the CT procedure even faster and more autonomous:

- Implementing a reliable automatic FEB & ODE reset before each test run;
- Parallelizing the procedure across multiple detector regions, reducing runtime by up to a factor of 8;
- Review the test to minimize false noise-related errors.



## What next?

---



**Thank you for  
your attention**

---