



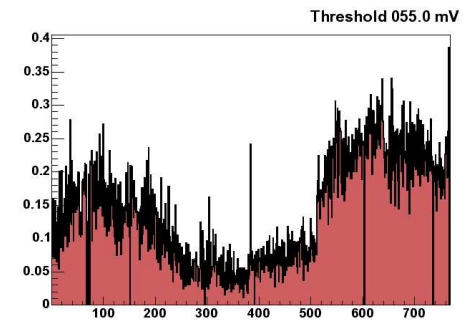
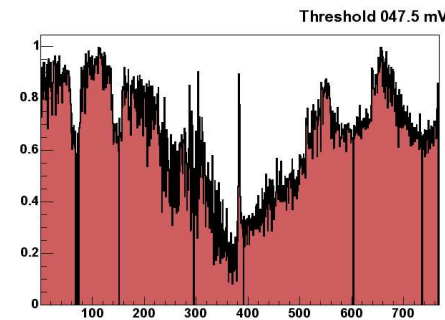
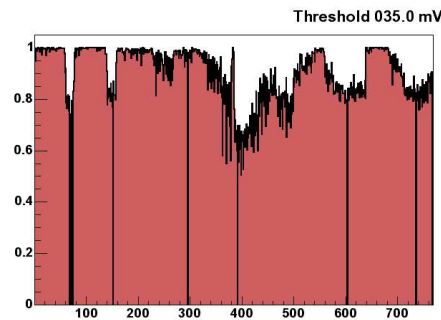
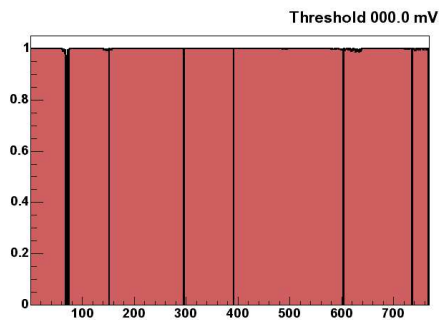
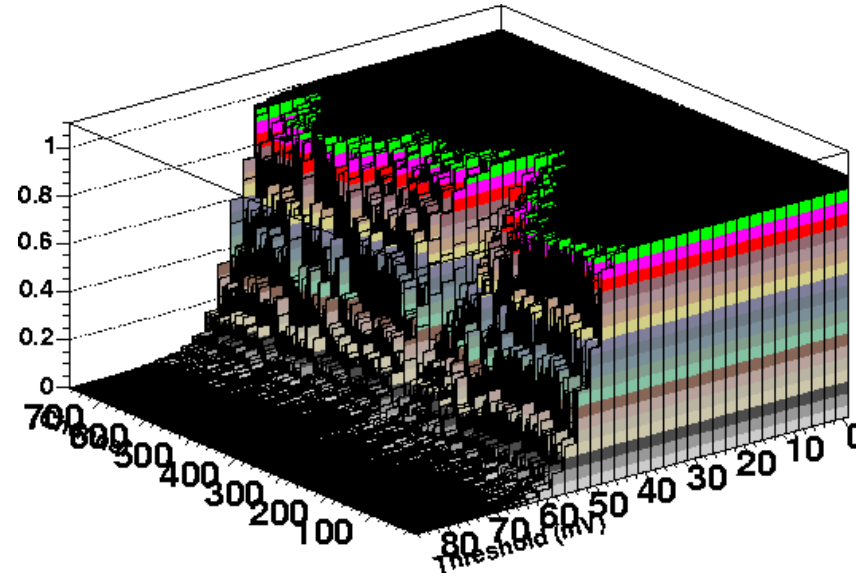
Endcap Module Scurves

- All endcap modules built and measured so far are **within specs**, as far as performance is concerned
 - Gain ~ 50 mV/fC
 - Noise ≤ 1500 e⁻ ENC @ T $\sim 10^\circ$ C
 - Noise occupancy $\ll 5 \times 10^{-4}$
- However, some show **distortions** in the **noise occupancy** s-curves at ≤ 0.3 fC.
 - *some depend on the set-up*
 - *Some others do not depend on the setup*

Site	Perfect	Distortion
NIKHEF	5	
Liverpool	3	2
Glasgow		2
Valencia		4
CERN	3	2
GVA	7	2
MPI/Prague		2

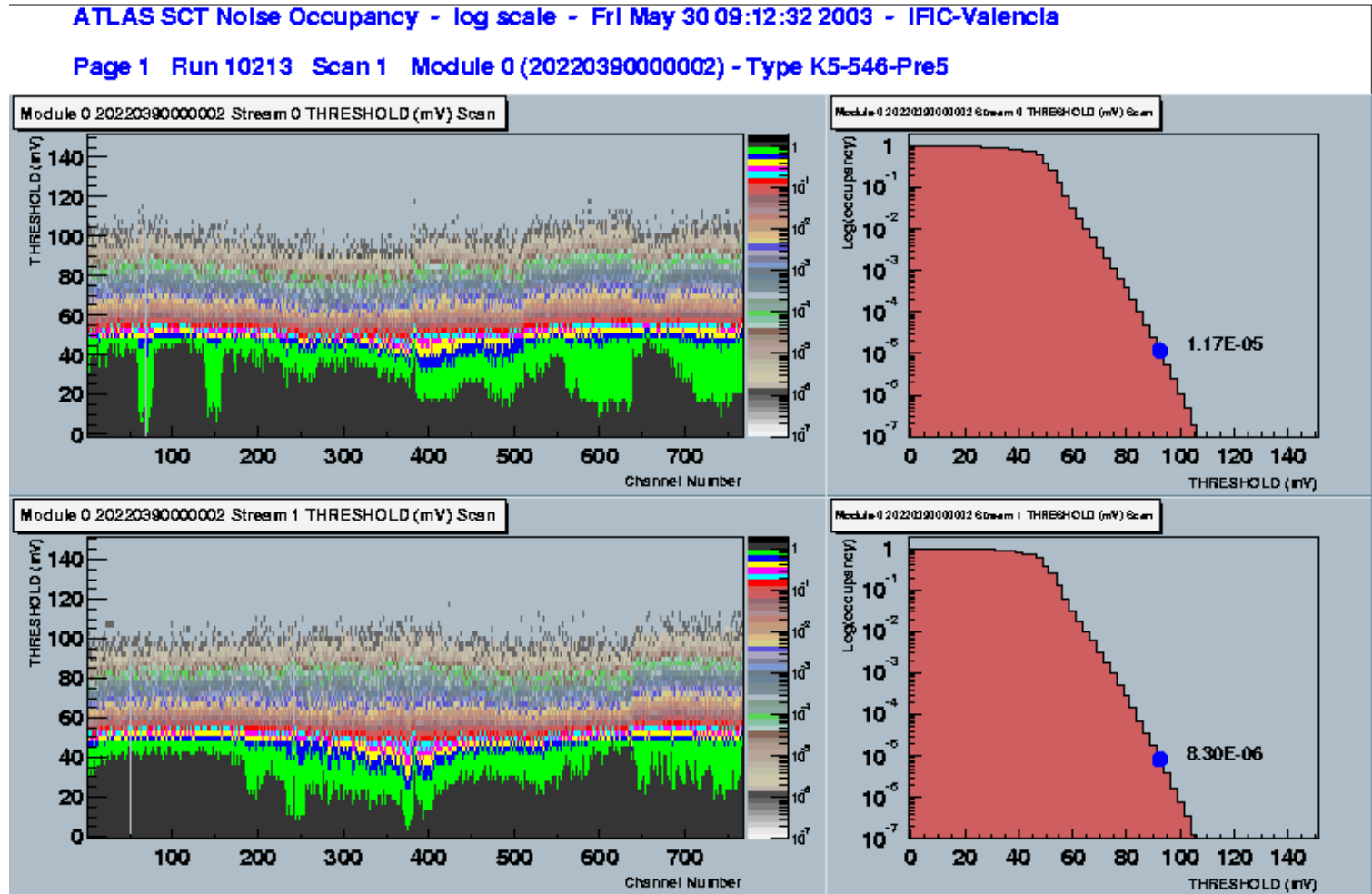
Symptoms

- 2 chips around cooling block show a sort of negative offset
- Magnitude depends on temperature



Standard plots

- This is how it is seen in the SCTDAQ plots
- Scale here is logarithmic...
- Seen as a *drop* in the occupancy at about 0.1-0.2fC

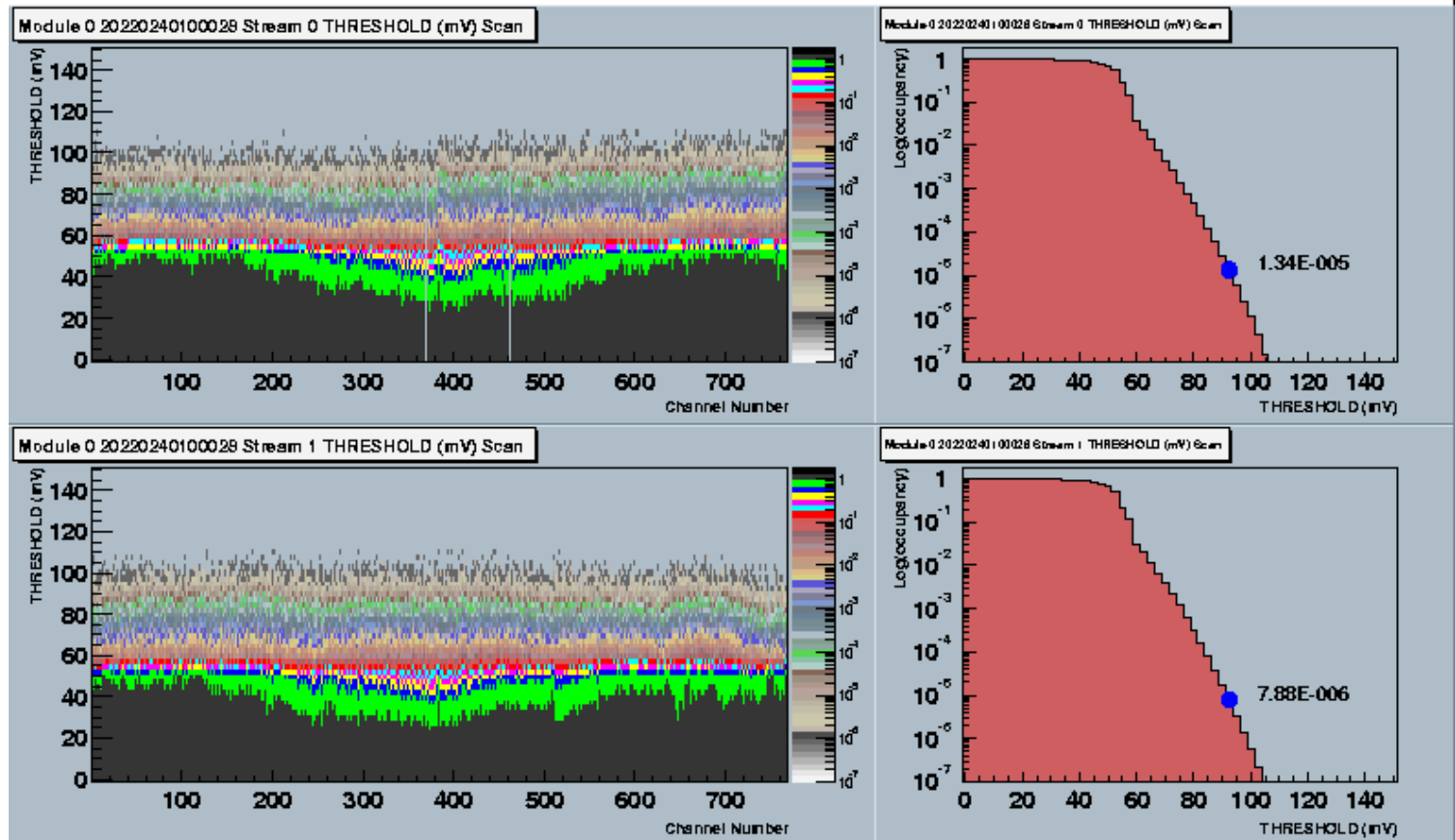


More cases

- A bigger *drop*
→ Clearly seen in the scatter plot

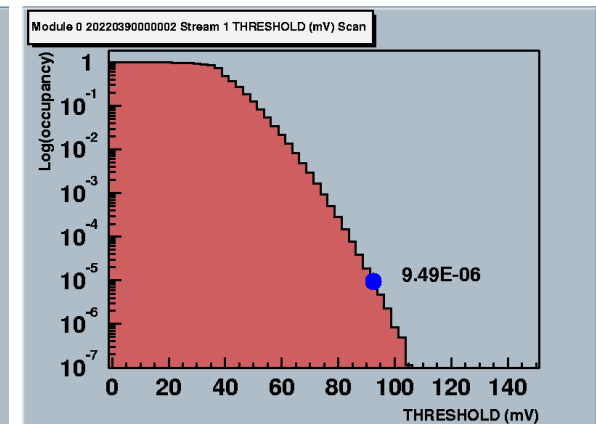
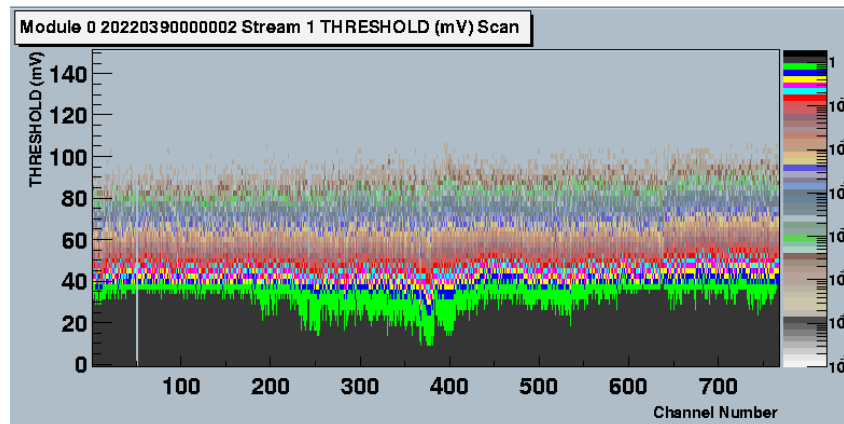
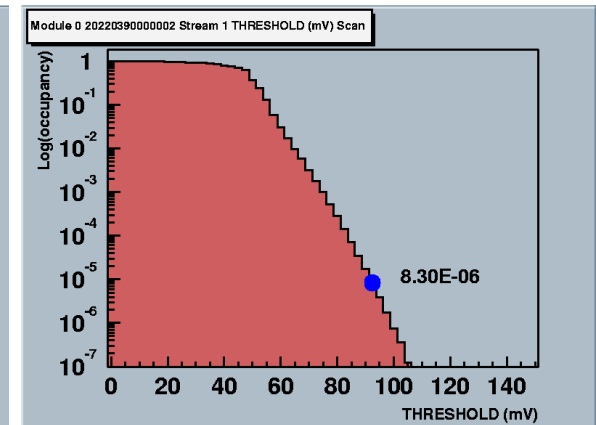
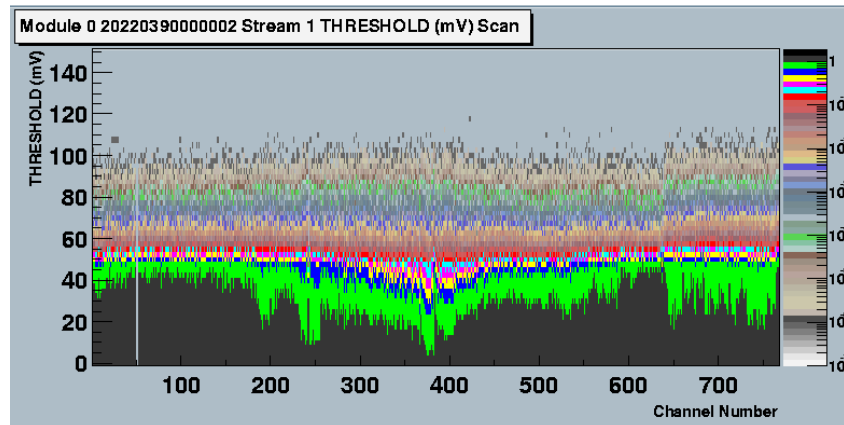
ATLAS SCT Noise Occupancy - log scale - Tue Jun 24 17:51:18 2003 - Glasgow

Page 1 Run 30 Scan 1 Module 0 (20220240100028) - Type Forward_Module



Temperature...

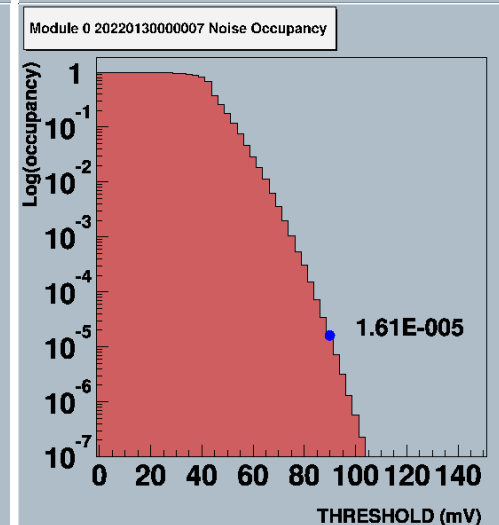
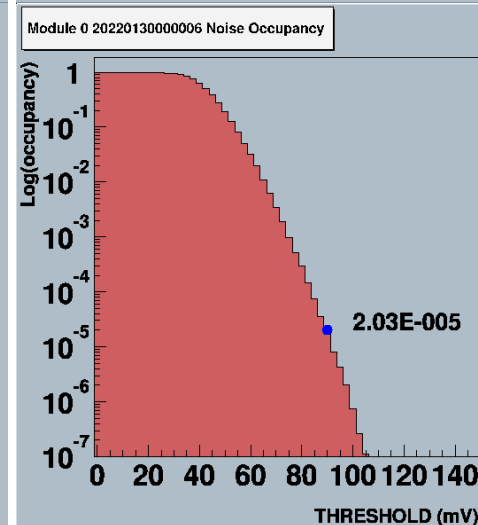
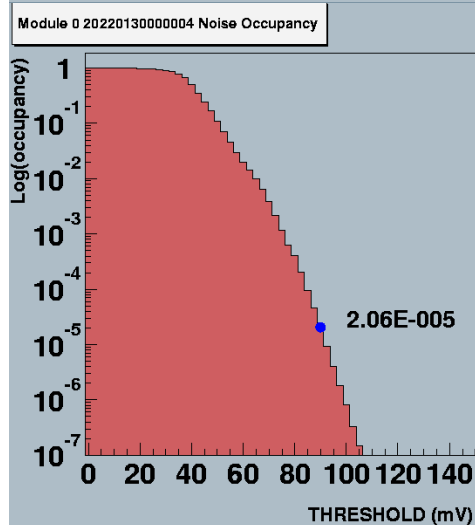
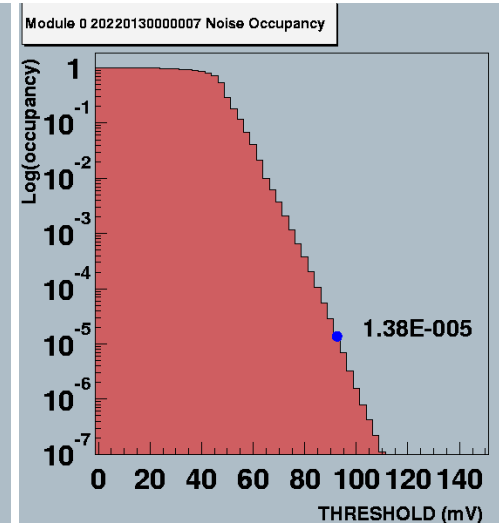
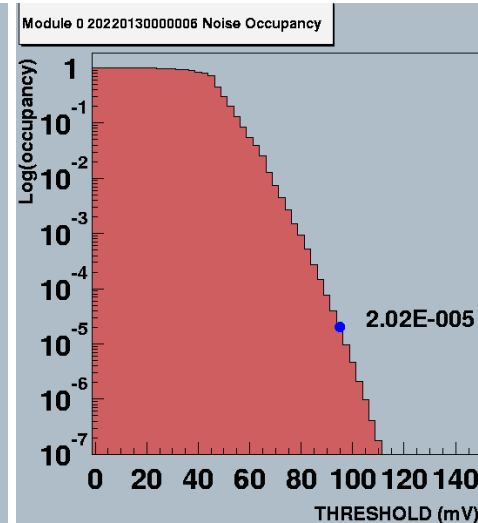
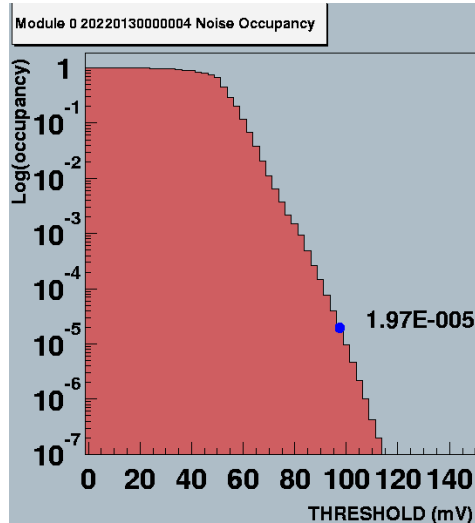
- Structure around cooling block
 - Same module, different temperatures
 - ✓ **Top:** 10°C
 - ✓ **Bottom:** 30°C
 - Distortion still there but at a smaller threshold. CB structure less pronounced
 - **No change in noise occupancy @1fc**



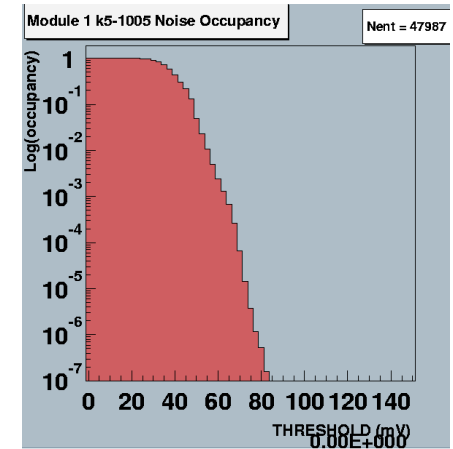
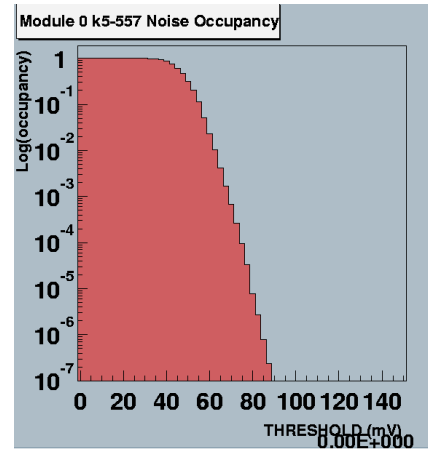
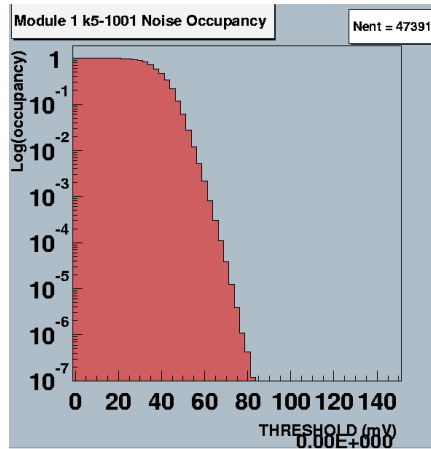


Setup

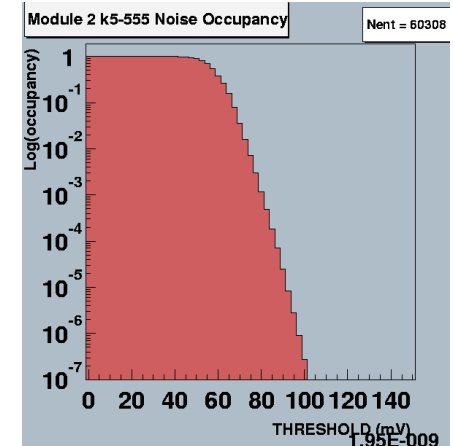
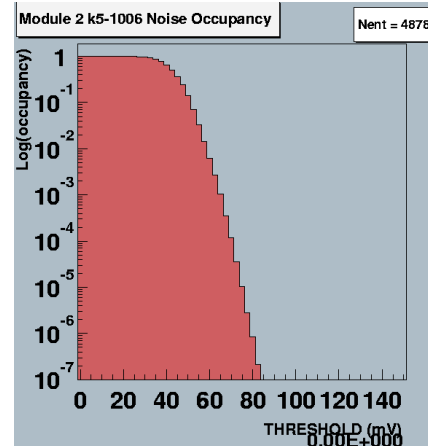
- Sometimes depends on the setup, sometimes does not
 - Top: CERN
 - Bottom: GVA (warm measurement)
- Same exercise with a VLC module measured in Liverpool.
 - No change, but effect reduced.
- **NO @ 1fc unaffected**



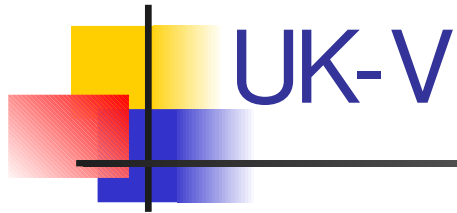
NI KHEF modules



- Inner modules
- Real optical readout.
- No sign of distortion.



20220990107657	K5-536	20220130000000	Out	Geneva	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20220990107533	K5-516	20220130000001	Out	Geneva	10	9	21	10	9	10	10	21	9	10	10	21	Z40617-W09	SCIPPW
20220990107538	K5-513	20220130000002	Out	Geneva	10	10	21	10	10	21	9	10	5	10	10	9	Z40617-W09	SCIPPW
20220990107536	K5-515	20220130000003	Out	Geneva	9	10	10	9	10	10	10	9	10	101	10	10	Z40617-W12	SCIPPW
20220990107665	K5-542	20220130000004	Out	Geneva	9	10	21	10	9	10	10	10	10	10	21	10	Z40801-W08	SCIPPW
20220990107666	K5-543	20220130000005	Out	Geneva	10	9	9	9	10	9	10	10	10	10	9	9	Z40801-W07	SCIPPW
20220990107667	K5-544	20220130000006	Out	Geneva	10	21	10	10	9	9	9	10	9	9	9	9	Z40801-W10	SCIPPW
20220990107671	K5-548	20220130000007	Out	Geneva	10	_s1	10	10	10	10	9	9	10	10	4	10	Z40801-W10	SCIPPW
20220990136065	K5-559	20220130000008	Out	Geneva	0	0	0	0	0	0	0	0	0	0	0	0	Z40920-W02	SCIPPW
20220990136064	K5-558	20220130000009	Out	Geneva	0	0	0	0	0	0	0	0	0	0	0	0	Z41183-W02	CERN
20220990136067	K5-561	20220130000010	Out	Geneva	0	0	0	0	0	0	0	0	0	0	0	0	Z40920-W03	SCIPPW
20220990158198	K5-1012	20220130000011	Out	Geneva	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20220990158190	K5-1004	20220130000012	Out	Geneva	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20220553121010	03/12/10/10	20220130000013	Out	Geneva	0	0	9	9	9	0	0	0	9	0	0	0	Z41125-W21	CERN
20220553120704	03/12/07/04	20220130000014	Out	Geneva	0	0	0	0	9	0	21	0	0	0	0	0	Z41125-W20	CERN



20220990107477	K5-505	20220240100027	Out	Manchester	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20220990103076	K5-500	20220240100028	Out	Manchester	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20220990107516	K5-507	20220240100029	Out	Manchester	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20220990107676	K5-553	20220240100030	Out	Manchester	10	10	9	9	9	10	9	10	10	10	10	21	Z40801-W08	SCIPPW
20220990107668	K5-545	20220240100031	Out	Manchester	10	10	10	9	9	10	21	10	10	10	10	10	Z40801-W10	SCIPPW
20220990158010	02/35/06/15	20220240100032	Out	Manchester	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20220990136068	K5-562	20220240100033	Out	Manchester	0	0	0	0	0	0	0	0	0	0	0	0	Z40920-W02	SCIPPW
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20220990158189	K5-1003	20220240100035	Out	Manchester	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20220990136066	K5-560	20220240100037	Out	Manchester	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20220990136070	K5-564	20220240100038	Out	Manchester	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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20220990158188	K5-1002	20220240100043	Out	Manchester	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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20220553131414	03/13/14/14	20220240100046	Out	Manchester	0	9	21	0	0	0	0	0	0	0	0	0	Z41125-W16	CERN
20220990107670	K5-547	20220390000001	Out	Valencia	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20220990107669	K5-546	20220390000002	Out	Valencia	10	10	9	10	9	10	9	10	10	10	10	10	Z40801-W07	SCIPPW
20220990158071	K5-571	20220390000003	Mid L	Valencia	21	10	9	10	10	10	10	9	9	21	10	9	Z40801-W09	SCIPPW



NIKHEF+ MPI / Prague

20220990107673	K5-550	20220990228676	MidL	Munich MPI	10	10	10	9	9	9	10	10	9	10	9	10	Z40801-W07	SCIPPW
20220990107672	K5-549	20220990228736	MidL	Munich MPI	10	10	10	9	10	9	10	9	9	10	10	10	Z40801-W08	SCIPPW

20220990136061	K5-555	20220281000555	Inn	NIKHEF	0	0	0	0	0	0	0	0	0	0	0	0	Z40920-W02	SCIPPW
20220990136063	K5-557	20220281000557	Inn	NIKHEF	0	0	0	0	0	0	0	0	0	0	0	0	Z40920-W02	SCIPPW
20220990158187	K5-1001	20220281001001	Inn	NIKHEF	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20220990158191	K5-1005	20220281001005	Inn	NIKHEF	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20220990158192	K5-1006	20220281001006	Inn	NIKHEF	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Grounding

- Recently tried to fine tune grounding scheme:
 - VDC has non-differential lines
 - Pseudo-optical readout magnifies some problems:
 - ✓ Coupling with test boxes lids (metallic)
 - ✓ Pick-ups depend of VDC switching amplitude
 - See Ashley's talk



Conclusions

- Distortion appears at ≤ 0.3 fC
 - Still a big margin left if modules operated @ 1fC threshold
 - NIKHEF does not see it:
 - ✓ Real optical read-out has been in the past far less sensitive to these *phenomena*.
 - ✓ Ashley's studies seem to confirm that...