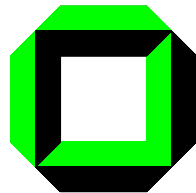


Status-report Ring3-Module-Production in Karlsruhe

Peter Blüm, Guido Dirkes, Manuel Fahrer, Javier Fernandez, Stefan Heier, Thomas Müller,
Hans Jürgen Simonis, Thomas Weiler, Tino Ortega Gomez

Institut für Experimentelle Kernphysik

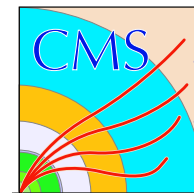
Universität Karlsruhe (TH)



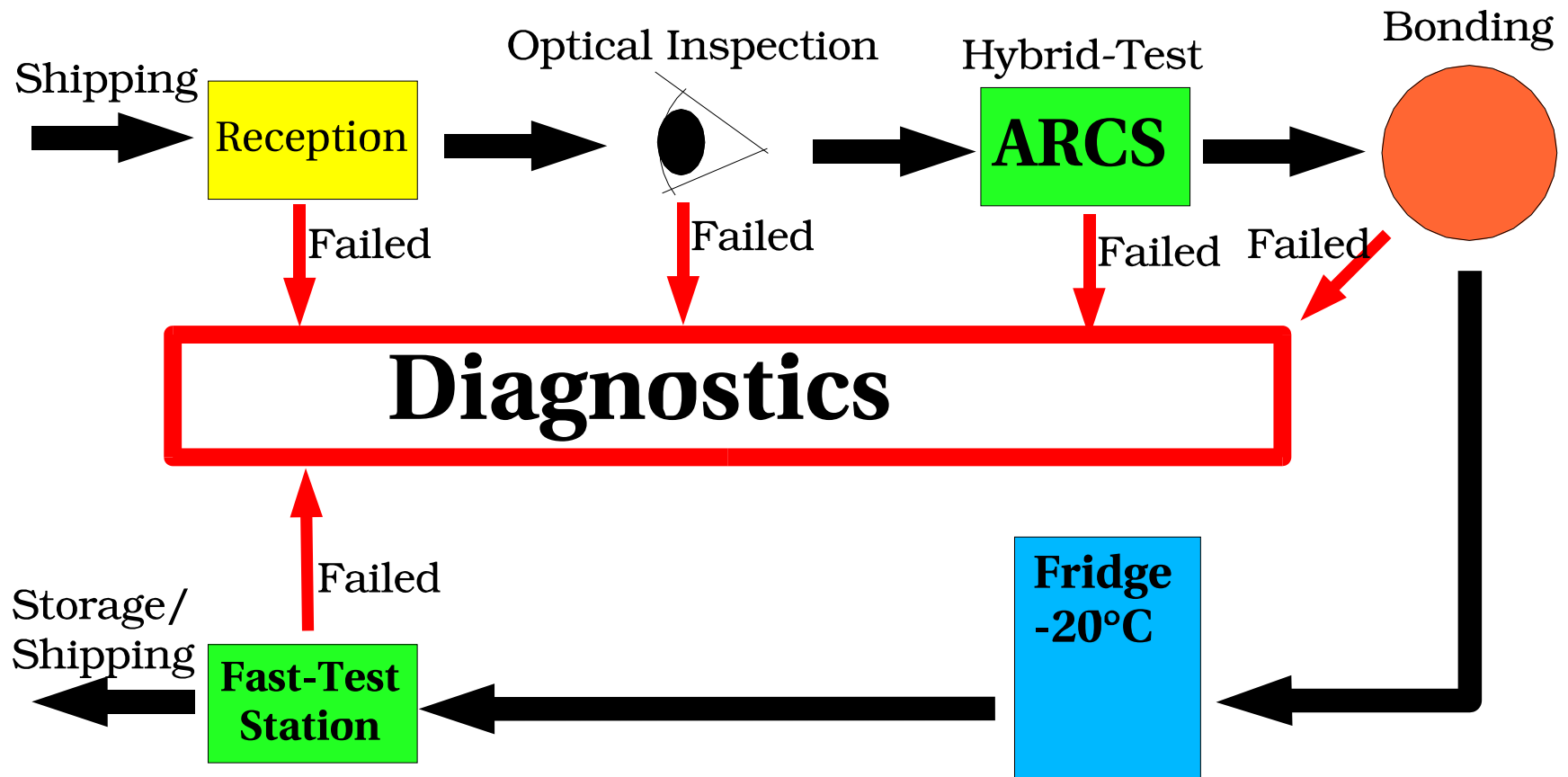
bmb+f - Förderschwerpunkt

CMS

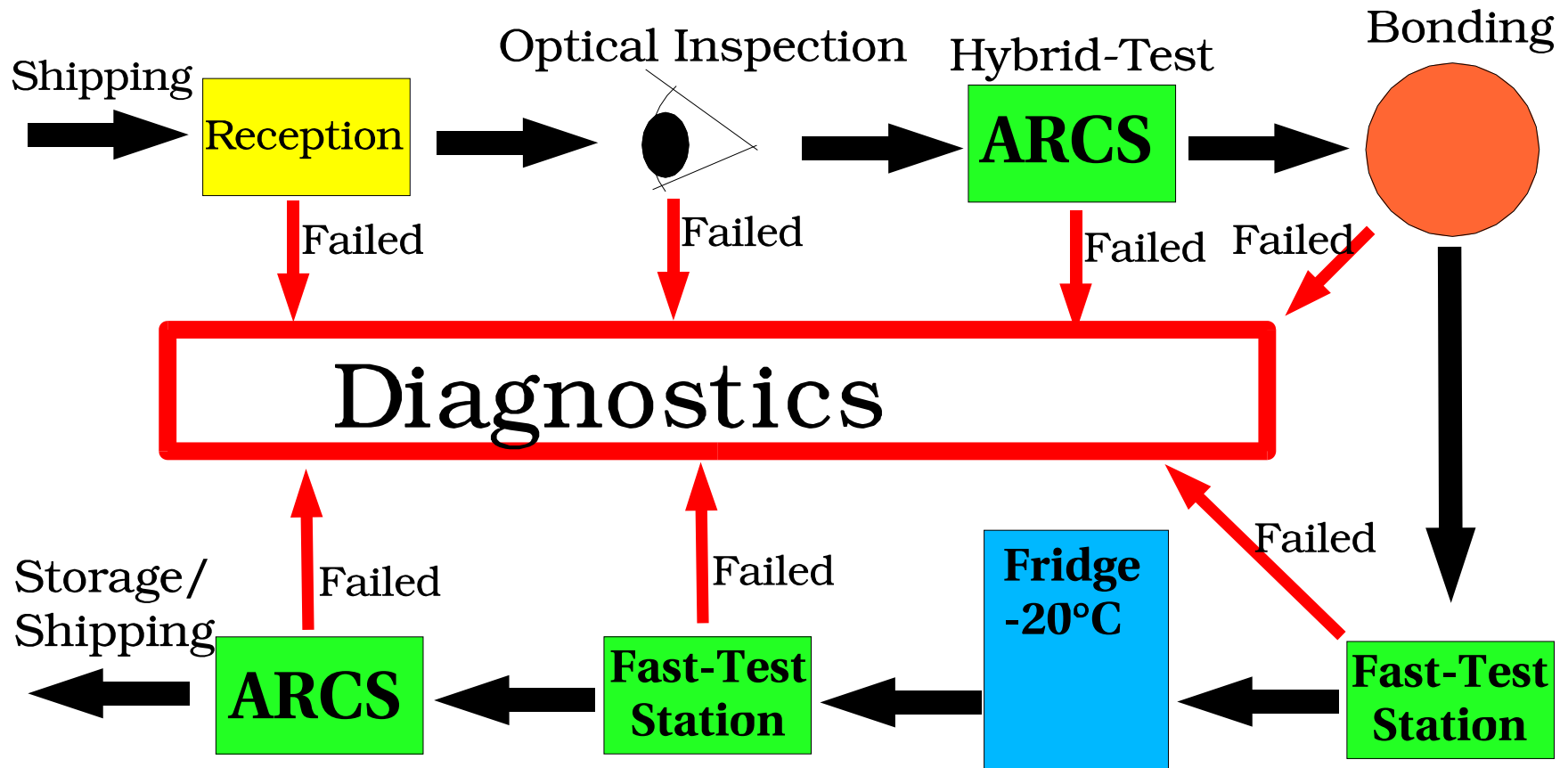
Großgeräte der physikalischen
Grundlagenforschung



Module Bonding- and Test-Procedure



Module Bonding- and Test-Procedure



Ring3-Modules bonded in Karlsruhe

<i>Module-ID</i>	<i>Results</i>	<i>Module-ID</i>	<i>Results</i>	<i>Module-ID</i>	<i>Results</i>
27046	Grade A	27077	Grade A	27685	Grade A
27047	Grade A	27078	Grade A	27686	Grade A
27048	Grade A	27079	Grade A	27687	Grade C
27049	Grade A	27080	Grade A	27688	Grade A
27068	Grade A	27081	Grade A	27689	Grade A
27069	Grade A	27677	Grade A	27690	Grade A
27070	Grade A	27678	Grade A	27706	Grade A
27071	Grade A	27679	Grade A	27707	Grade A
27072	Grade B	27680	Grade A	27708	Grade C
27073	Grade A	27681	Grade A	27709	Grade A
27074	Grade A	27682	Grade A	27710	Grade A
27075	Grade A	27683	Grade A	27711	Grade A
27076	Grade A	27684	Grade A		

● Blue ID-Numbers (302000200.....): Module could **not** be tested with
ARC-System



Qualification-Results

Module-ID of rejections:

- 30200020027 687
- 30200020027 708

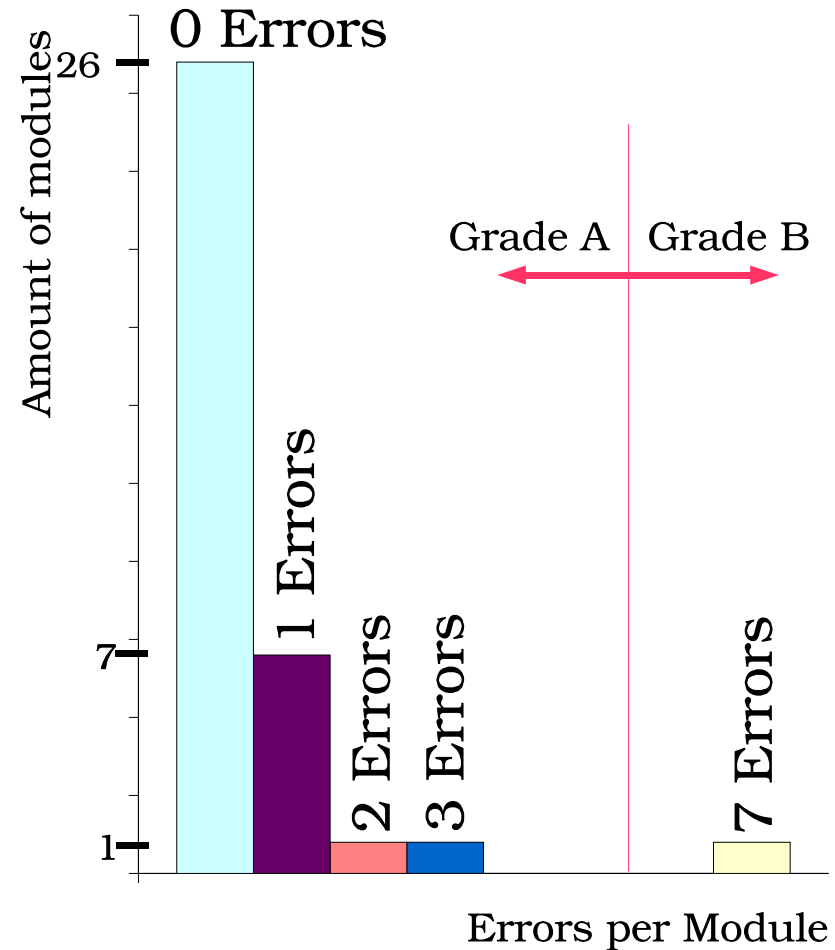
Rejects:
2 Modules
=> 5.3%

One Grade B Module:

- 30200020027 072

Grade A:
35 Modules

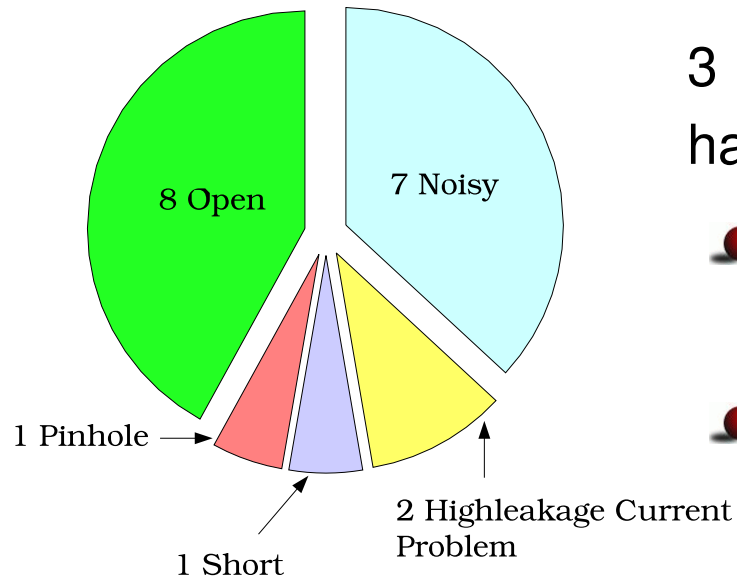
Grade B:
1 Module



- Fast-Test-Station was cross-checked with ARC-System 33 times with equal grading
- Cooling-cycle leads to no new errors so far

Error Analysis

Error type frequency of occurrence

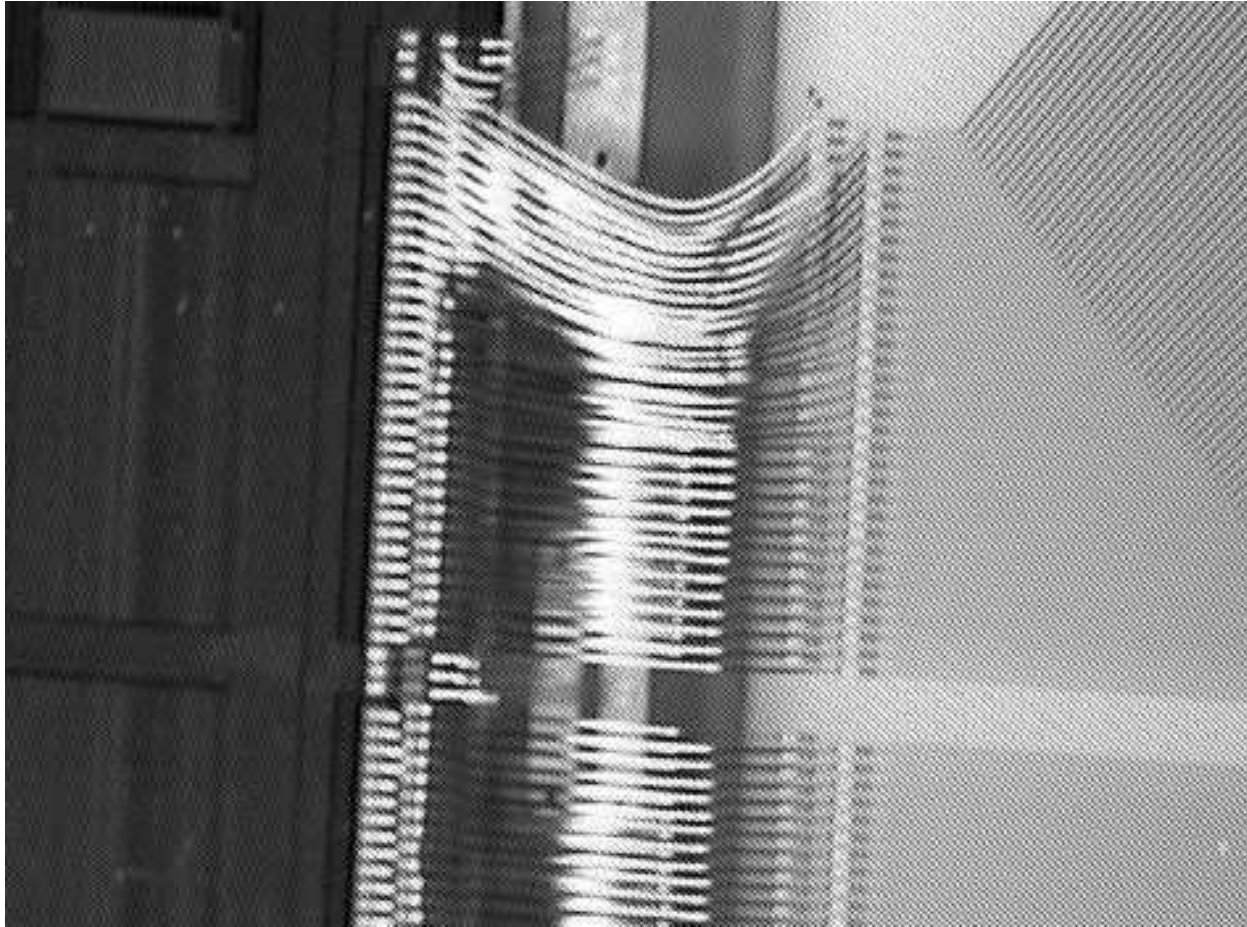


3 modules with test-results Grade A have some irregularities

- Module...27678 shows some distorted bonds on first APV
- Module...27681 and ...27074 has some effects in noise

- Module ..27686 had a pinhole. Correlated Bond was un-bonded and flagged afterwards as PA-Sensor-Open

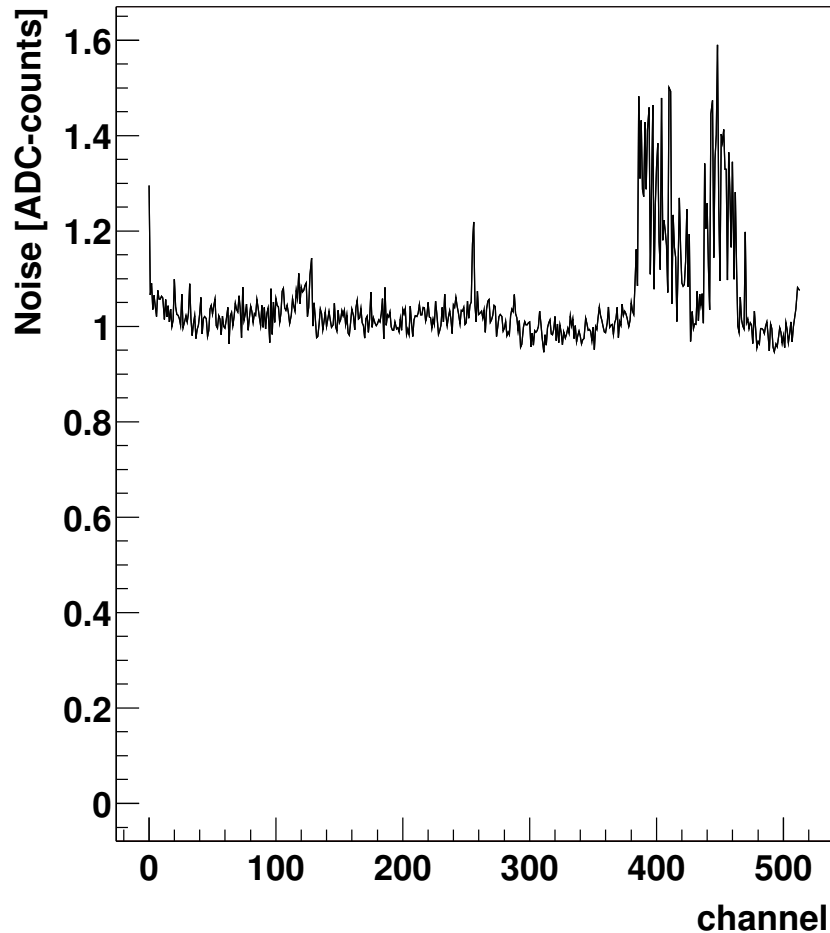
module ...27678: Grade A



- Grade A
- touched bonds
- How to deal with?
- Database
- To Long Term Test?

touched bonds have no electrical effect

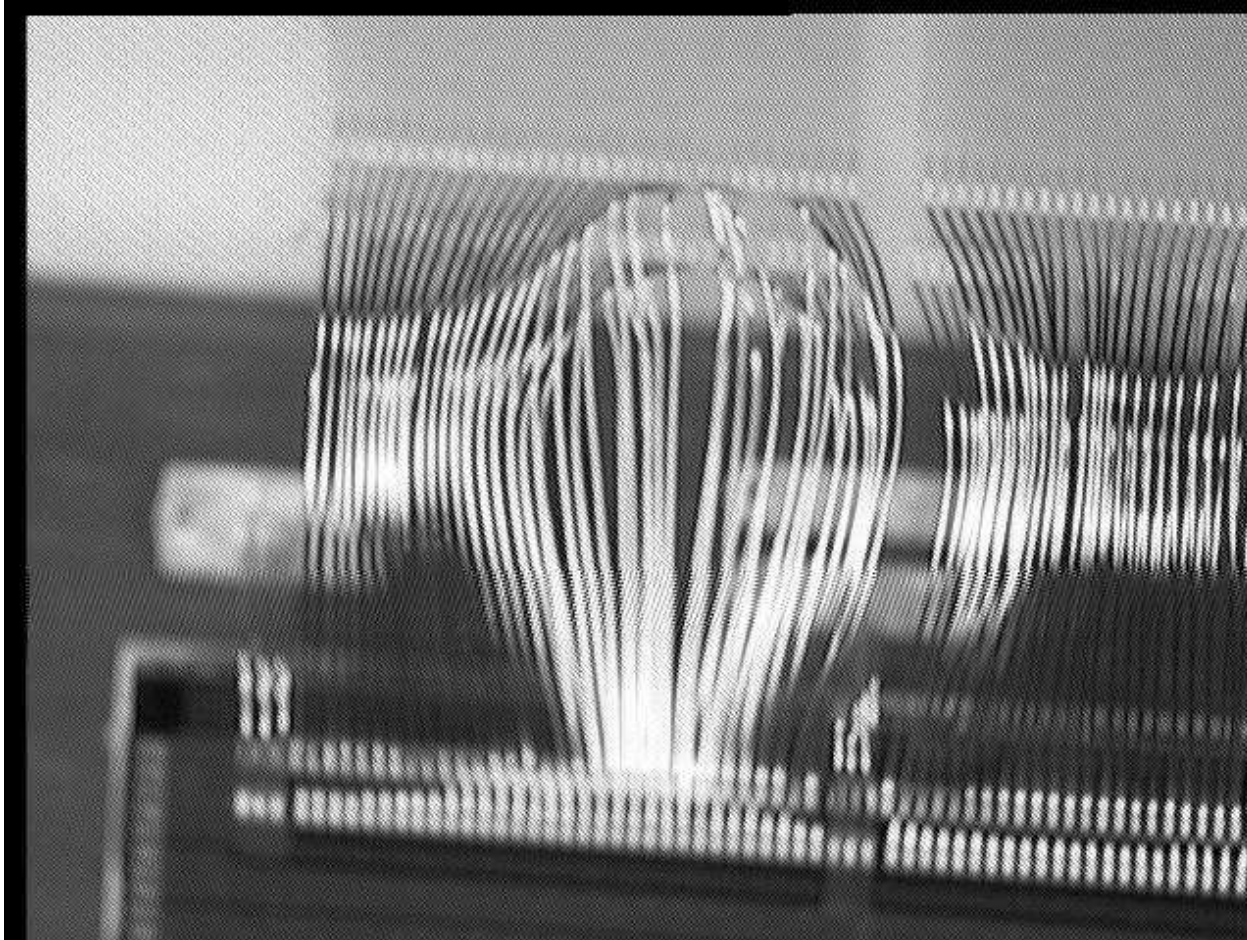
module ..27681 and ..27074: Grade A



- Module-test classified as Grade A
- Noise shows some significant difference on last APV
- Optical inspection shows no conspicuity
- How to deal with?
- APV-effect?
- Long-Term-Testing?
- Further tests needed!

flag this problem with stronger cuts → more rejects

module ...27687: Grade C

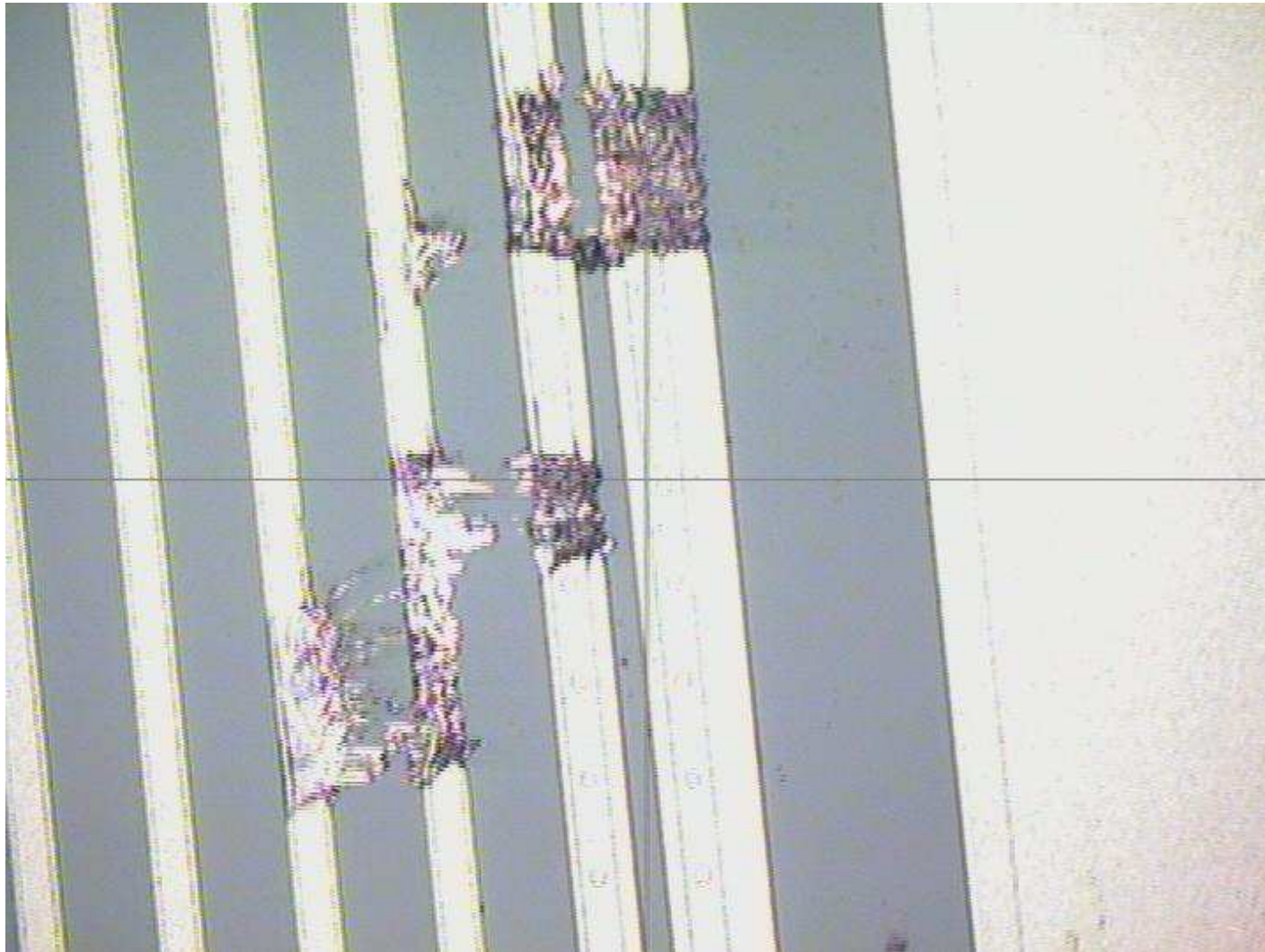


- distorted bonds on 2. APV
- Test results:
 - SN 1-2 Short
 - SN 8 Noisy
 - SN 23 Noisy
- IV-behavior: break-through above 480V

touched bonds have no electrical effect

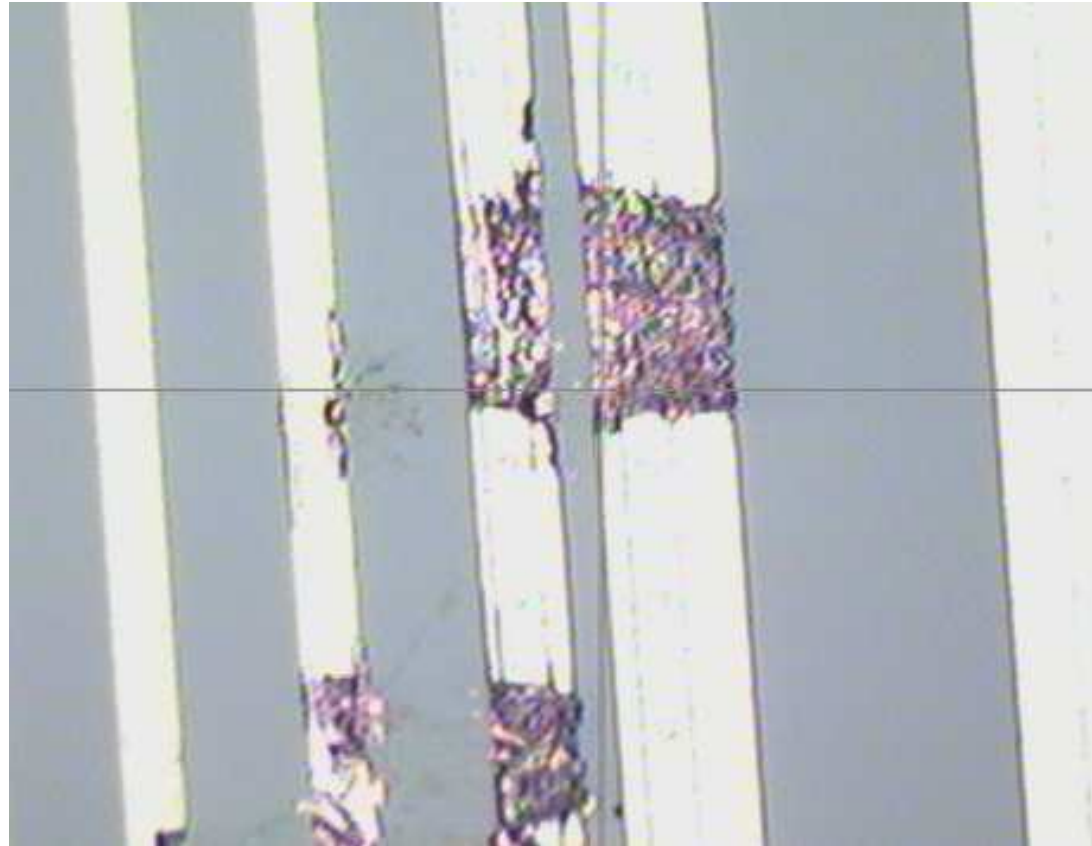
Shorts on module 687

From right to left: Guard-Ring; Bias-Ring; Strip 1: Strip 2...



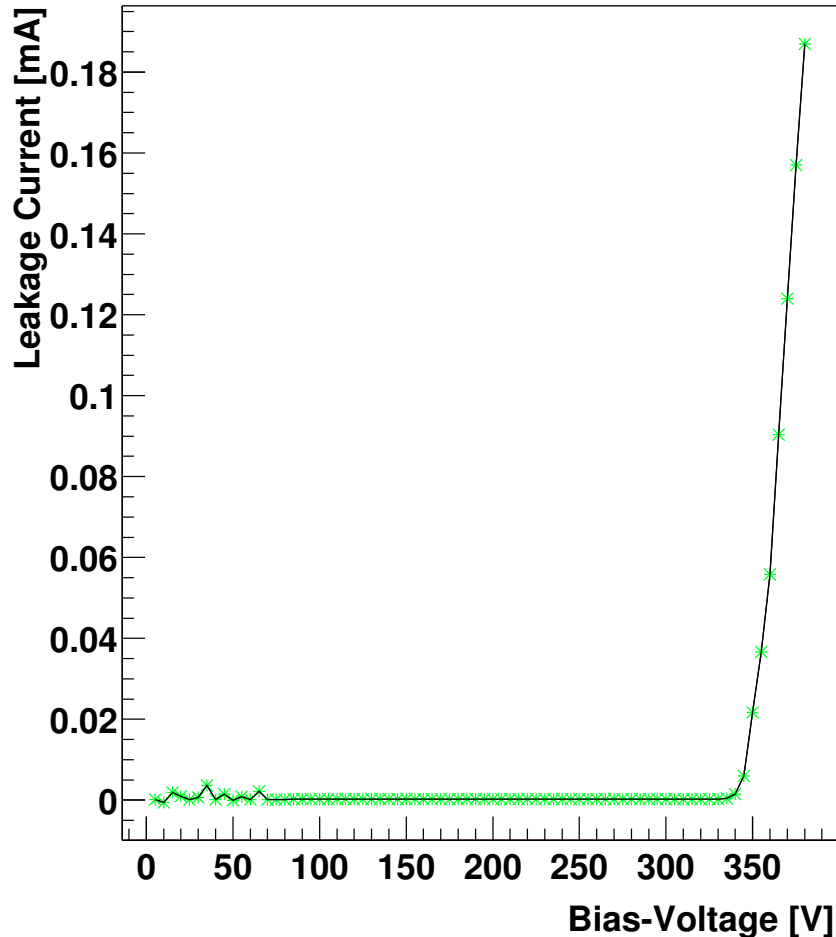
module 687 after scratching

After remove of the electrical connection



break-through removed: but too high leakage current: $\sim 20\mu$ A at 400V

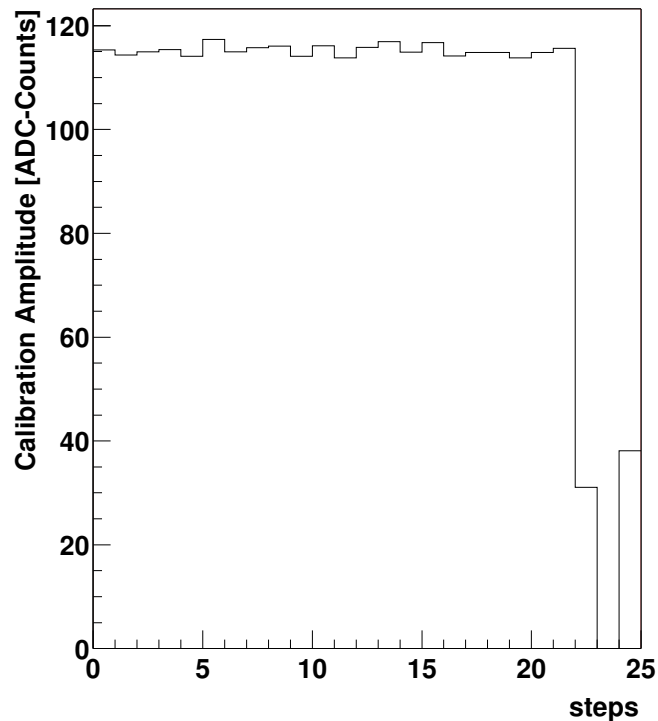
module ...27708: Grade C



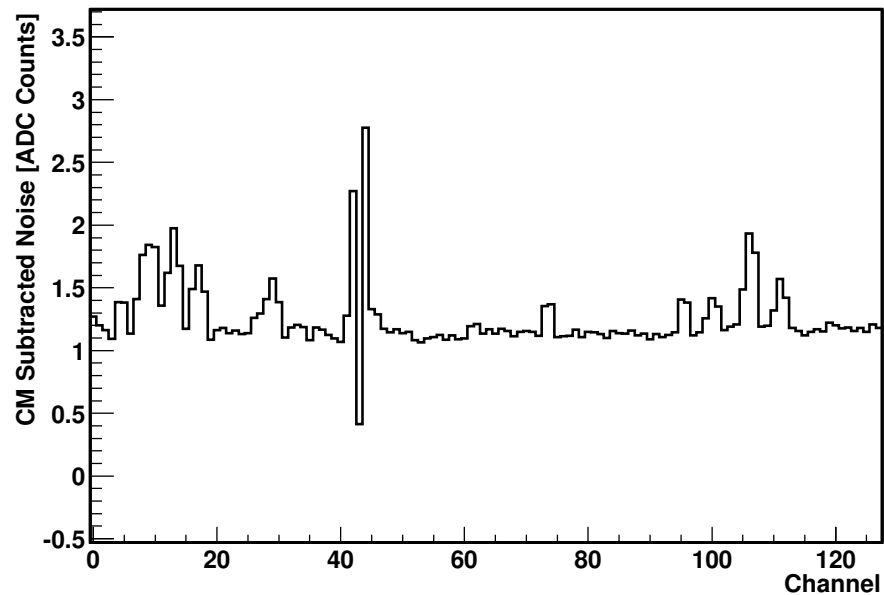
- Module was tested before and after cooling-cycle and qualified as Grade A
- later the module showed some unstable IV-behaviour; break-through at ca 320 Volts
- There is no optical conspicuity on the module
- Further test needed

module ..27072: Grade B

- Module tested with ARCS → whole APV flagged as pinhole ⇒ **Test again** → PH 339 and 343 and strip group noisy flagged
- Testing with Fast-Test-Station localize effect around channel 341



channel 340



Results

- Karlsruhe has bonded series 38 of ring3 modules
- Cooling-Cycle produce no additional errors so far
- Fast-Test-Station successfully cross-calibrated to ARC-System
- 35 modules are qualified as Grade A and will go to integration centre or module Long-Term-Test
- improvement in optical inspection setup
- one module changed from Grade A to Grade C
- suspicious noise behaviour → stronger cuts ⇒ bigger reject-rate