Remapping on ONSEN

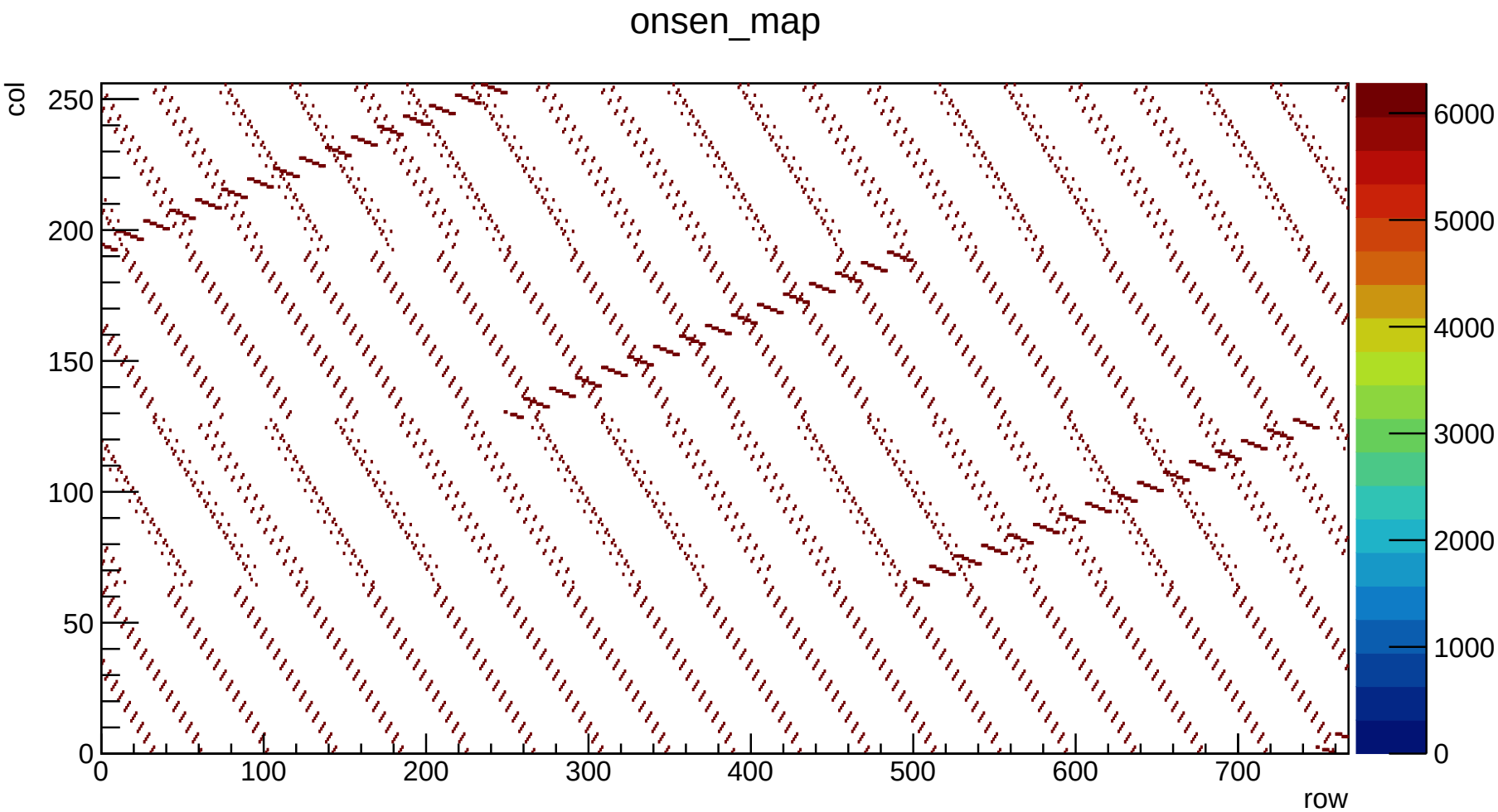
- **"Real hits"**: Global uCellID/vCellID → Natural (sensor-wide) corrdinates (matrix row/column) → gate/drain lines
- **Mapping** given by routing of drain lines to DCD input pads/channels
- **"DHP coordinates"**: DCD channel → DHP row/column
- BASF2 unpacker must inverse-map to obtain hit coordinates
- ROIs are also given in CellIDs ⇒ ONSEN performs mapping during ROI-check, but sends out original DHP coordinates
- (Inverse) mapping Described by a look-up table in BELLE2-NOTE-TE-2015-010

How to Confirm ONSEN Remapping

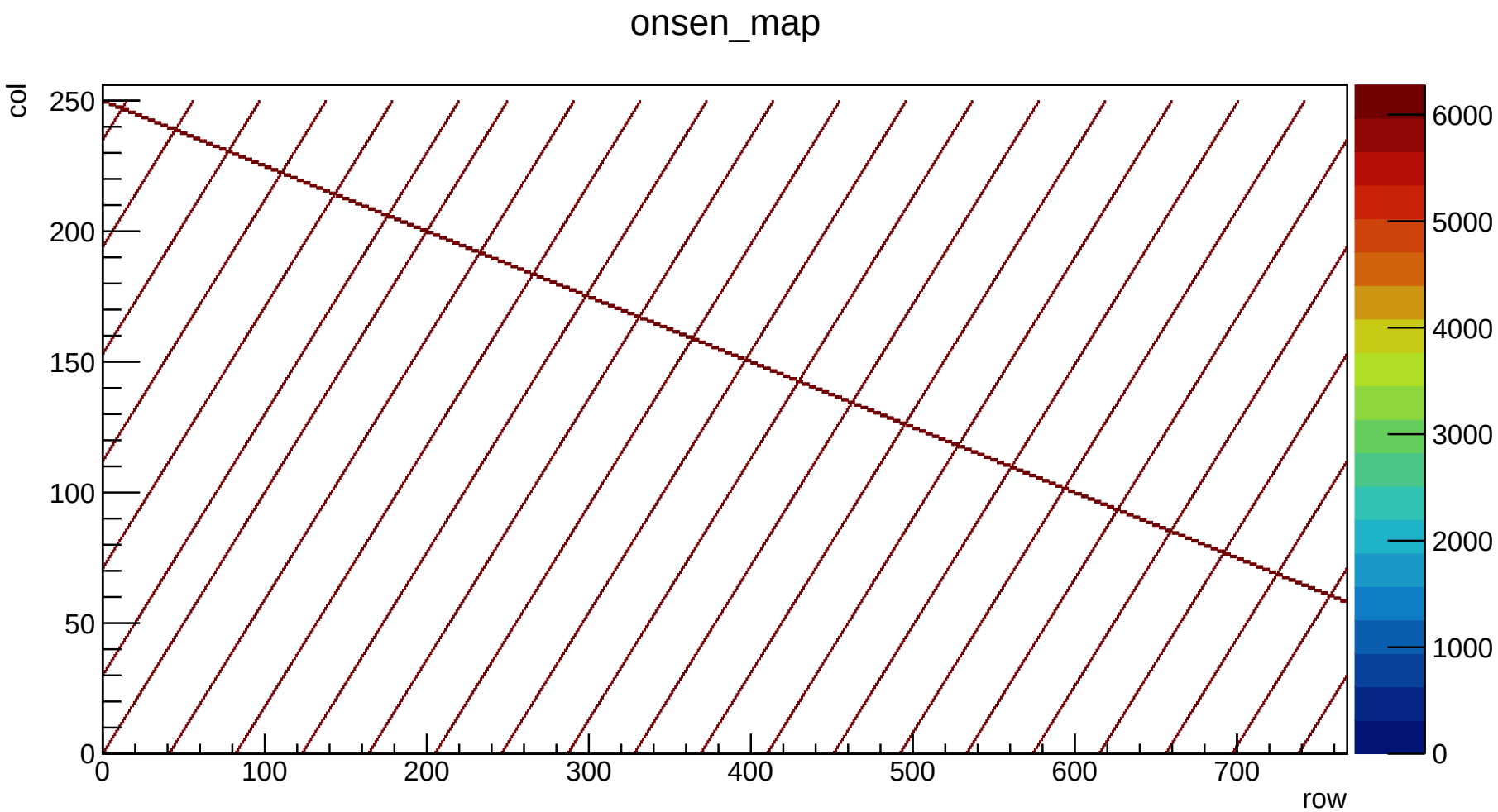
1. Confirm consistency of BASF2 mapping with reality: e.g., look at hit maps from a laser spot without ROI selection
2. Confirm consistency of ONSEN mapping with BASF2 mapping: Send ROI patterns and check that only pixels inside ROIs are sent out

- Matrix tests currently not possible $\rightarrow$ work-around:
- Mapping in BonnDAQ is believed to be correct
- Use BonnDAQ mapping to transform a regular hit pattern from CellIDs to DHP coordinates, and program it into DHP memory
- After BASF2 unpacking/remapping, the regular pattern should emerge
- Tested/analyzed yesterday by Klemens and Botho

OB not remapped



OB remapped


onsen_map
col
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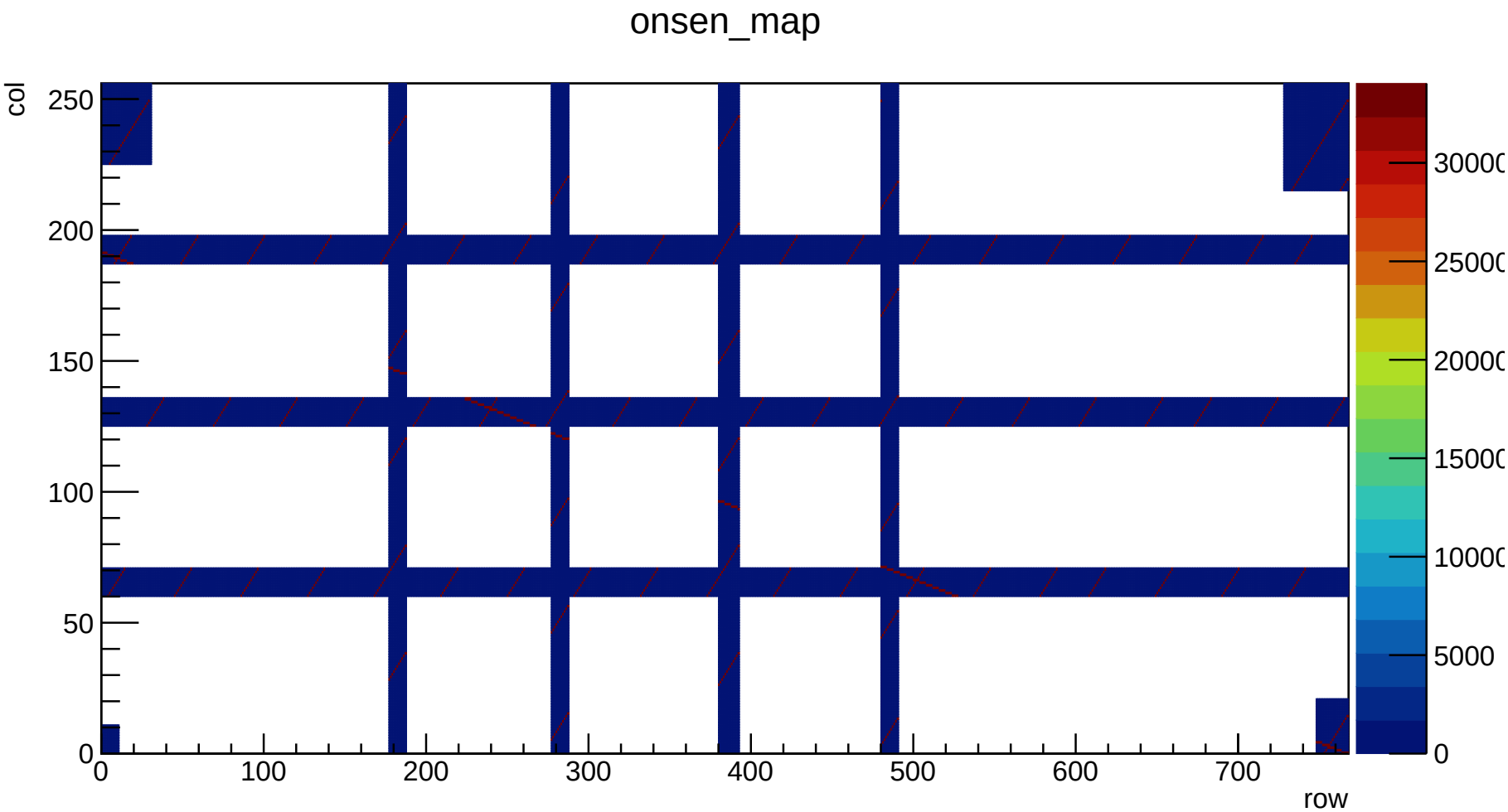
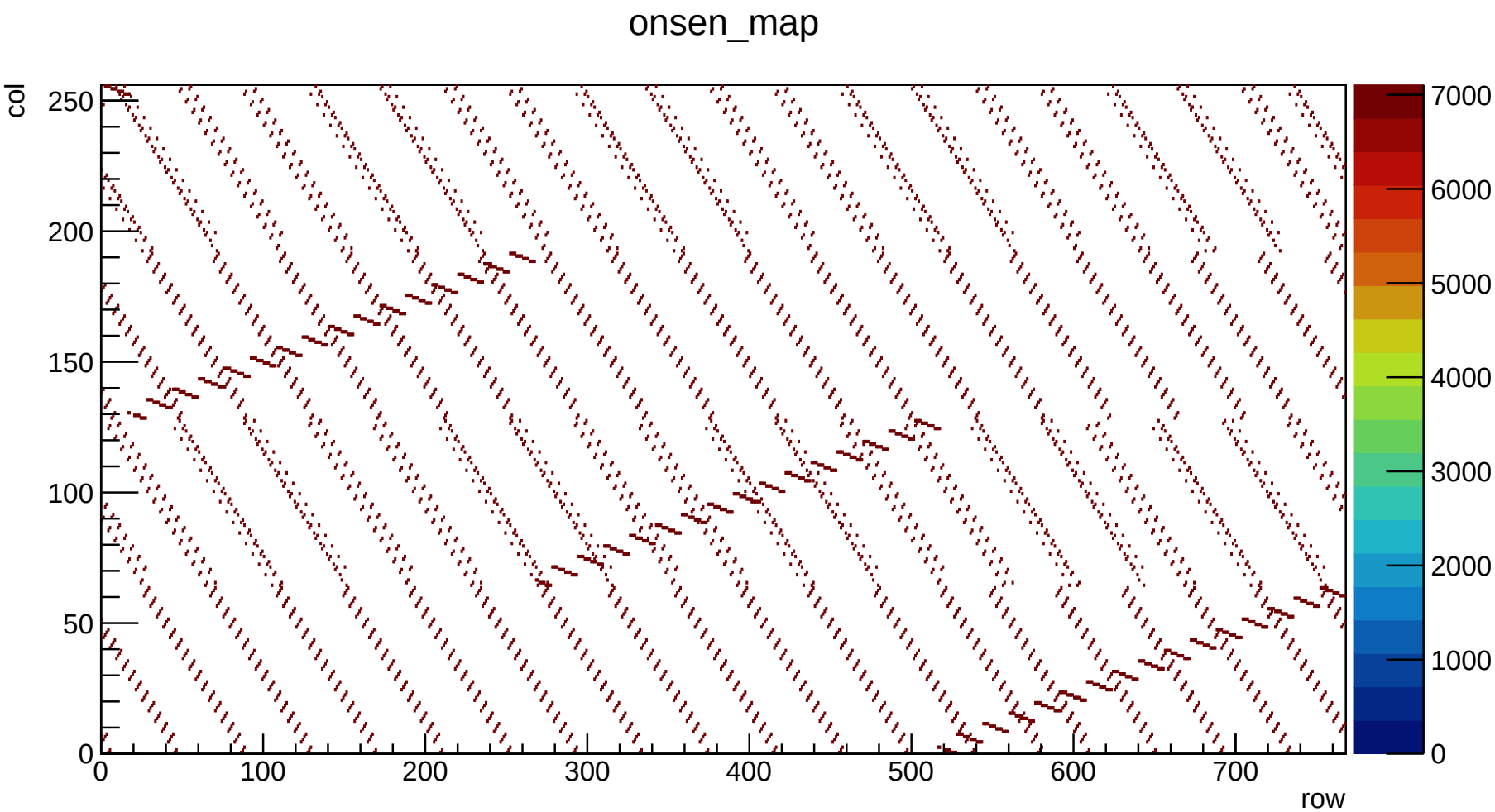
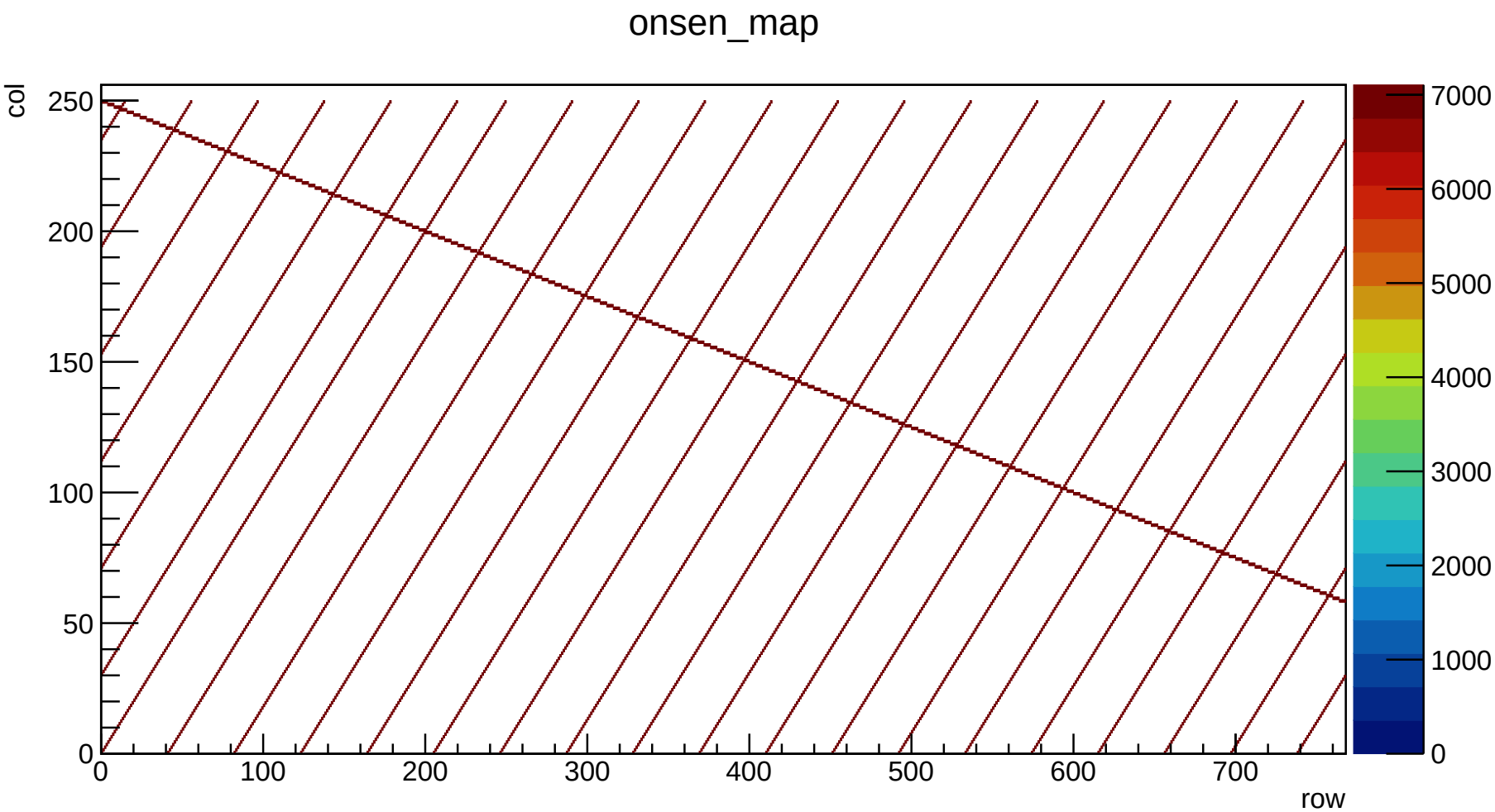
OB remapped with ROIs



IB not remapped



IB remapped


onsen_map
col
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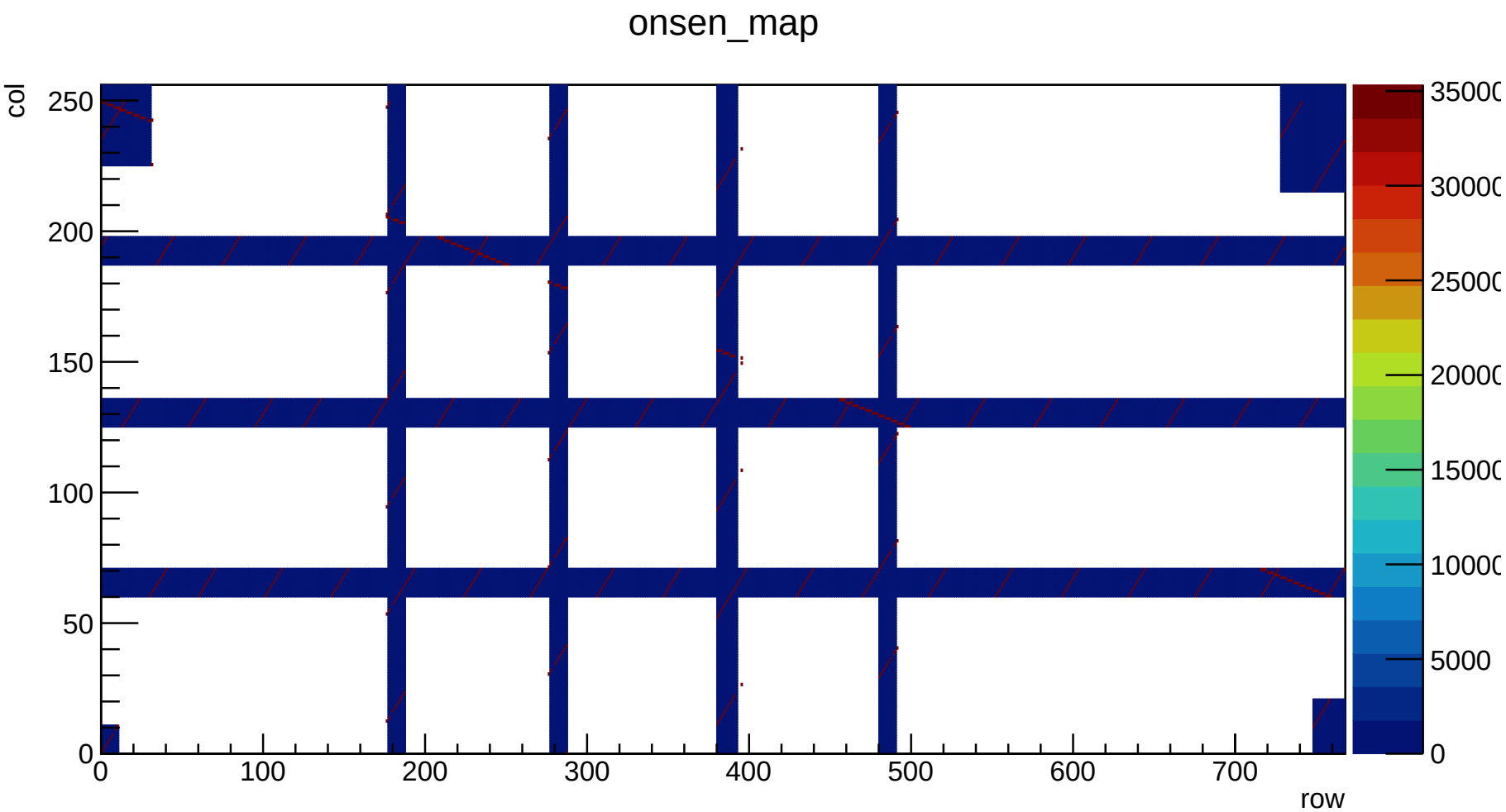
IB remapped with ROIs



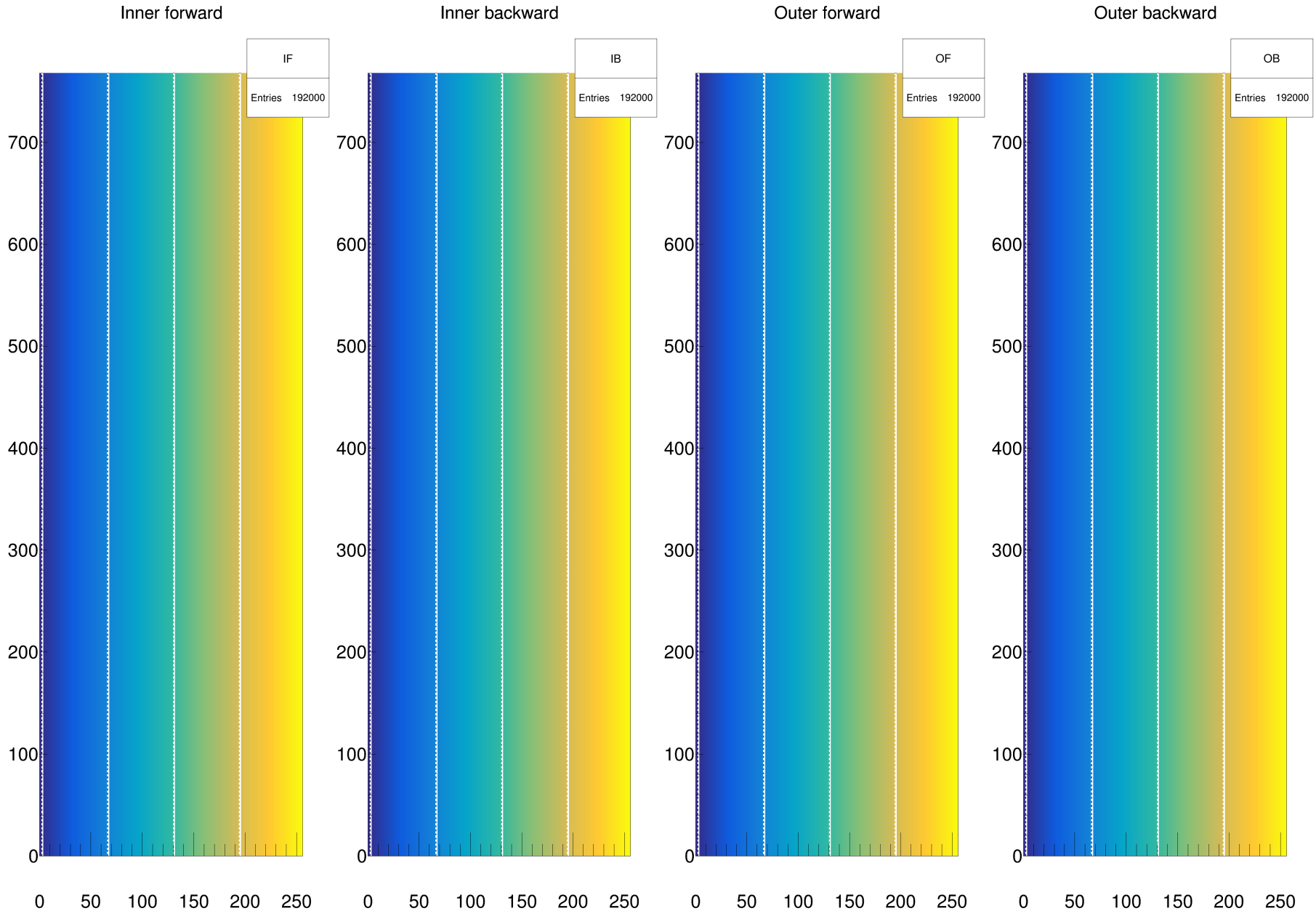
Difference between ONSEN and BASF2 Remapping

- BASF2 mapping seems consistent with BonnDAQ mapping, but ONSEN mapping differs for IB/OF sensors
- ONSEN strictly uses the look-up table from the Belle II note, BASF2 performs an additional row inversion:

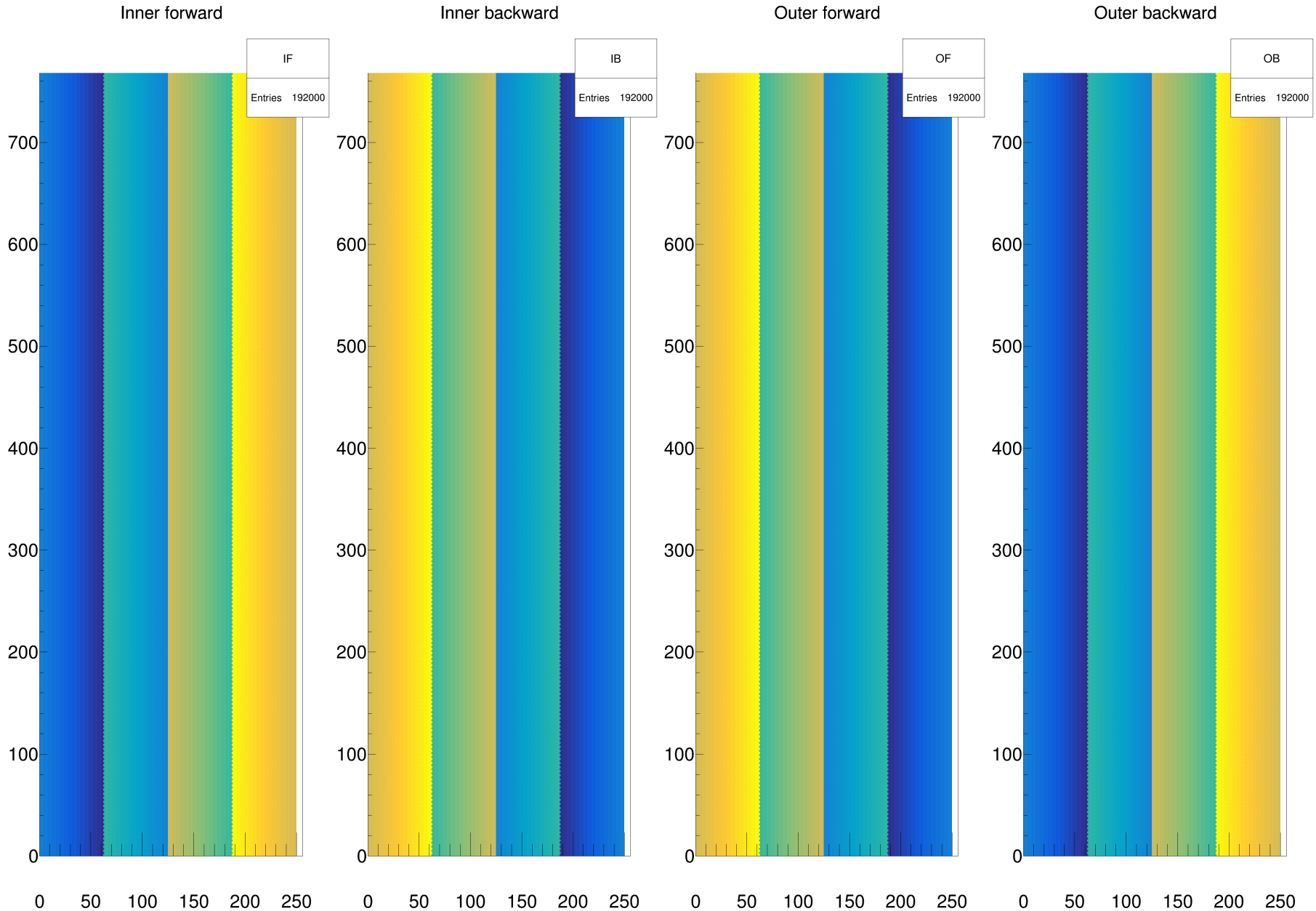
```
diff --git a/pxd/modules/pxdUnpacking/src/PXDUnpackerModule.cc b/pxd/modules/pxdUnpacking/src/PXDU
index 9887176..e10e47e 100644
--- a/pxd/modules/pxdUnpacking/src/PXDUnpackerModule.cc
+++ b/pxd/modules/pxdUnpacking/src/PXDUnpackerModule.cc
@@ -1804,9 +1804,6 @@ unsigned int PXDUnpackerModule::remap_row_IB_OF(unsigned int DHP_row, unsign
 //   B2INFO("row false " << DHP_row << " col false " << DHP_col << " DCD line " << DCD_channel <<
   if (((dhe_ID >> 5) & 0x1) == 0) {v_cellID = 768 - 1 - row ;} //if inner module
   if (((dhe_ID >> 5) & 0x1) == 1) {v_cellID = row ;} //if outer module
-  //inverts last two bit
-  v_cellID ^= (1u << 1);
-  v_cellID ^= 1u ;
 //  B2INFO("Remapped :: ROW $" << DHP_row << " to v_cellID $" << v_cellID);
   return v_cellID;
 }
```

- Question for experts: If this inversion is necessary, should it be included in the look-up table?

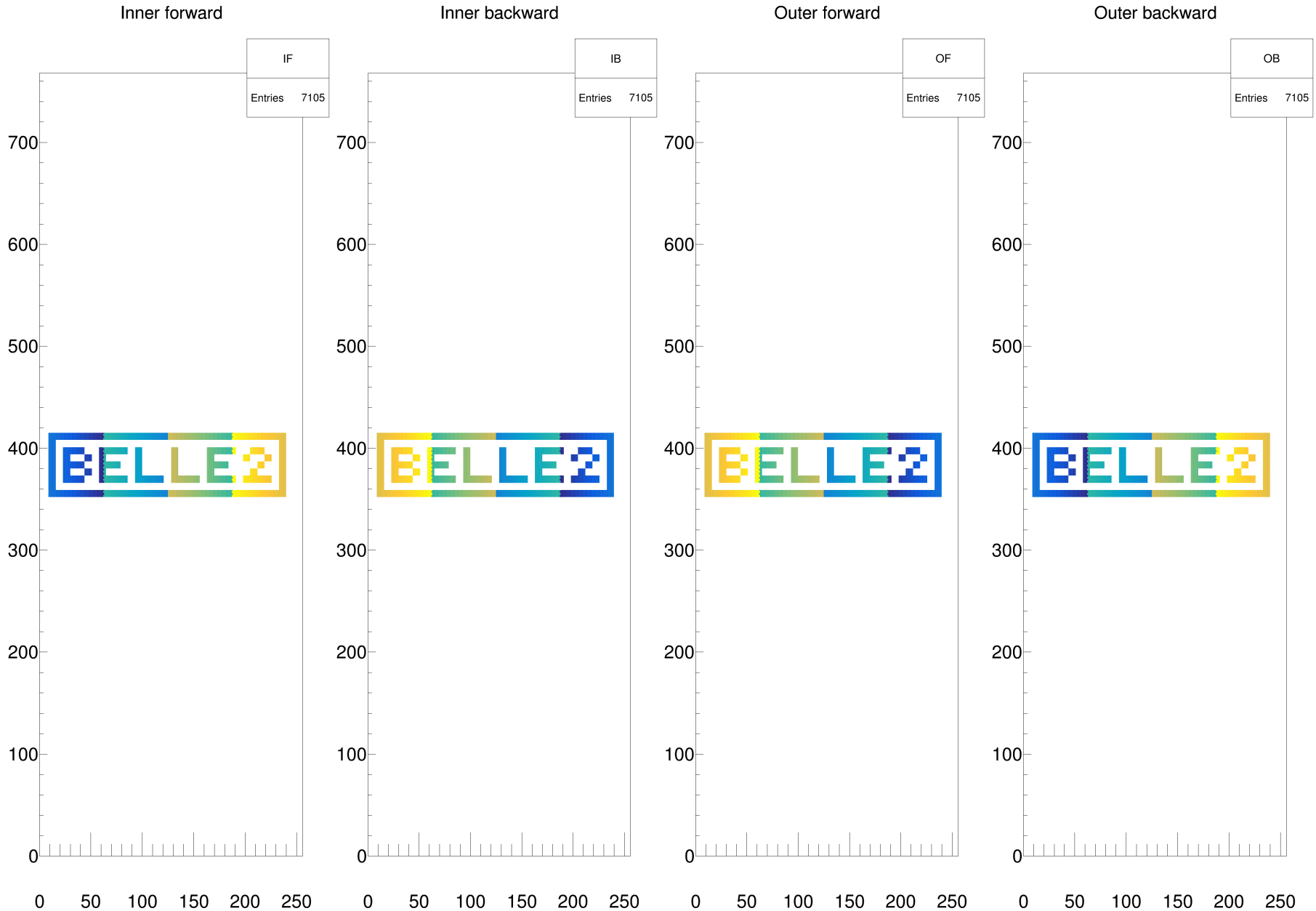
ONSEN remap: ✓, BASF2 remap: ✗, Send-All flag: ✓



ONSEN remap: ✓, BASF2 remap: ✓, Send-All flag: ✓



ONSEN remap: ✓, BASF2 remap: ✓, Send-All flag: ✗



ONSEN remap: ✗, BASF2 remap: ✓, Send-All flag: ✗