

DMILL Configuration **Controller**

I. Introduction/Overview

II. Config Testing

III. Production Plans

John Parsons
Nevis Labs, Columbia University

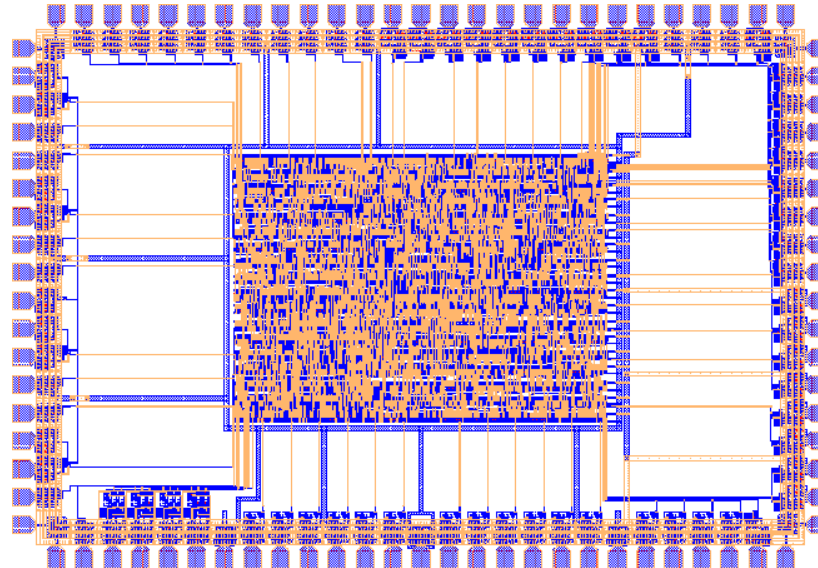
DMILL Config PRR, January 30, 2003

DMILL Configuration Controller

- **Config was designed by LAL/Nevis collaboration to provide interface between SPAC Slave and the various devices on the FEB which need to be configured**
 - **Design effort led by Ph. Cros during his visit from LAL to Nevis**
- **The design was reviewed in June 2000**
- **First (and final) design was submitted as part of MPW 511 in Sept. 2000**
- **A total of 40 packaged prototypes have been received and tested, from two different sets of wafers**
 - **First 20 devices were delivered in March 2001 and came from original wafers, which suffered from a via misalignment problem detected by the foudry**
 - **Second set of 20 devices were delivered in May 2001 and came from “backup wafers” processed by foundry without the via problem**
 - **As it turned out, both sets of devices were functional**

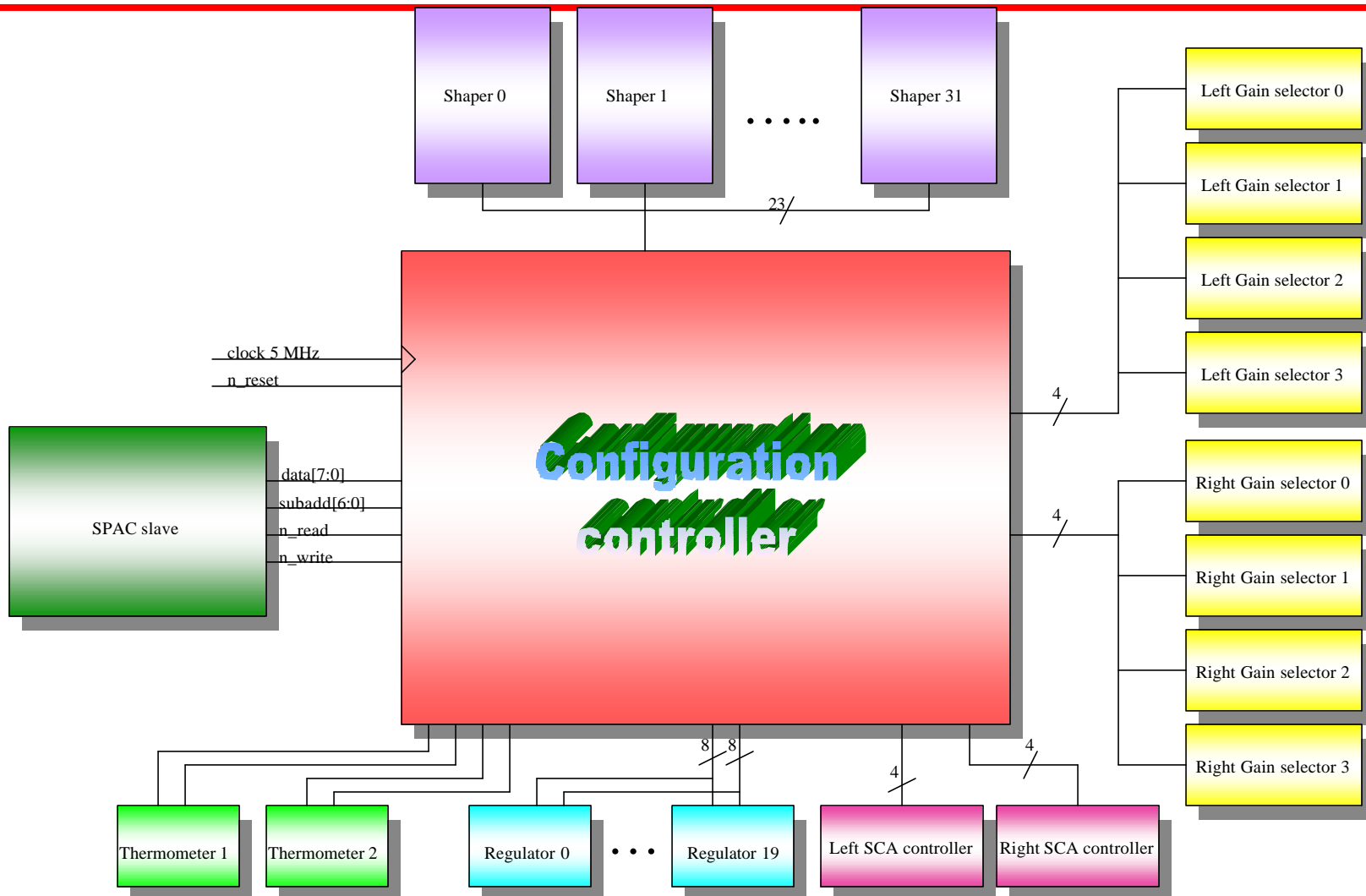
Config Design

- Connects to SPAC Slave using SPAC Parallel Interface at 5 MHz
- Configures various FEB devices via private buses
- Config die measures 31 mm² (pin limited)



- Config is packaged in 100 pin PQFP

Implementation of the configuration controller

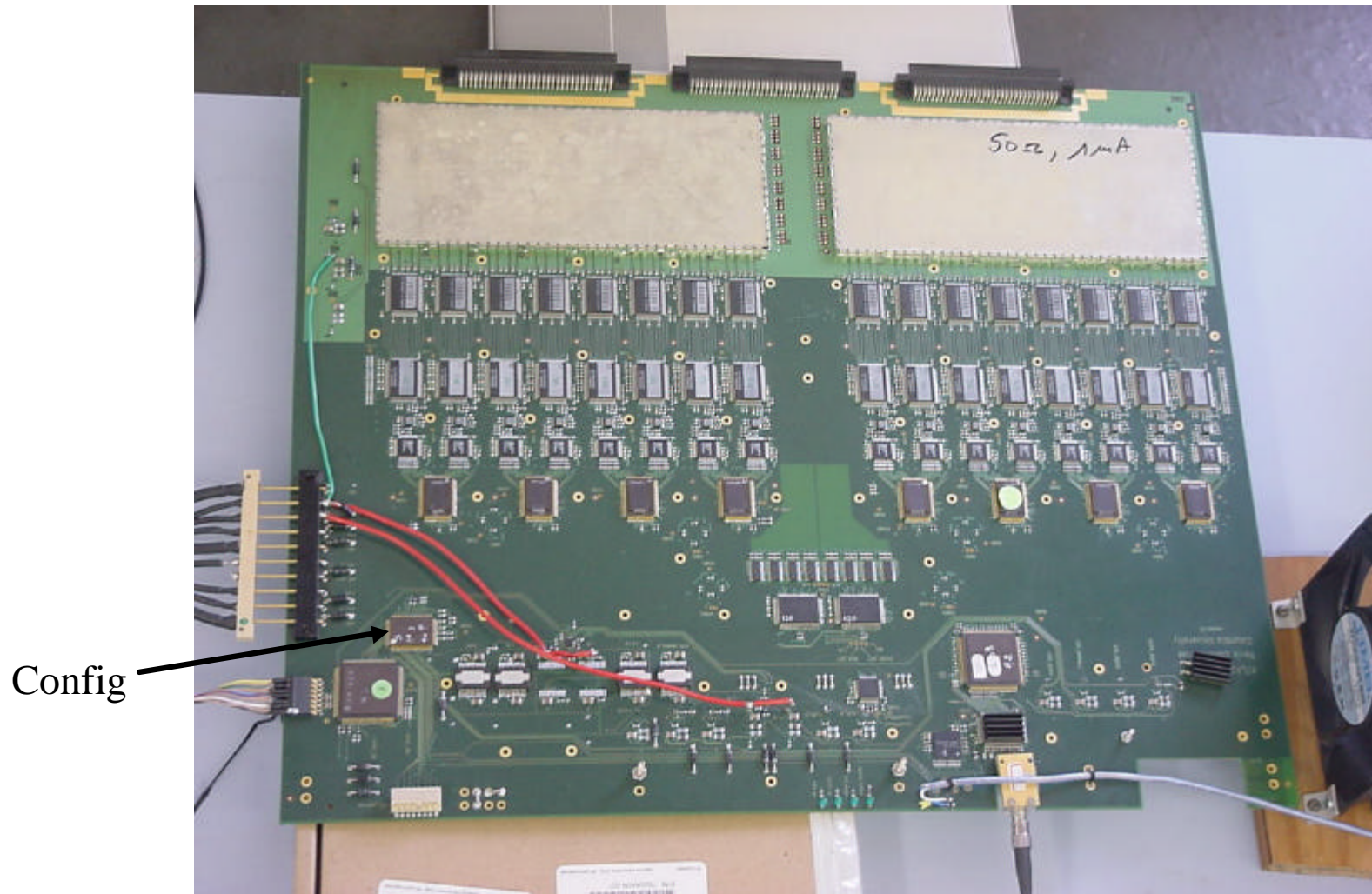


$$\text{Nb_of_pins} = 17+23+8+8+16+n_of_th = 72 + n_of_th$$

Config Testing Results

- **Config has been successfully tested on “1/4 Digital FEB”, where many of the various custom digital ASICs for the FEB were first integrated**
- **For more than 1 year, the Config has been used successfully on the final FEB prototypes, where all functionality has been exercised**
- **For chip acceptance and radiation testing, a separate, socketed test jig has been developed**
 - **Same jig and setup can be used for functional acceptance testing and for radiation testing**
 - **Functional tests of the 40 prototypes produced a yield of $37/40 = 92.5\%$**
 - **A total of 12 devices were irradiated with 158 MeV protons and demonstrated to be sufficiently tolerant to TID, NIEL and SEU**
 - **see presentation from Stefan Simion for details**

FEB Prototype



J. Parsons, Config PRR, Jan. 30/2003

Config Production Plans

- **Nevis is responsible for the production testing**
- **Config chips will be packaged in 100 pin PQFP with identical pinout to that used so far for the prototypes**
- **Packaged chips will each be labelled with a unique serial number**
- **Production Config chips will be functionally tested using same test jig and procedure as used for prototypes**
 - **A record will be kept of tests which are failed by Rejected chips**
- **Production quantity:**
 - **One Config chip is required for each of the 1627 FEBs to be produced**
 - **In addition, must provide 8% spare chips ∴ 1760 functional chips needed**
 - **Assuming 80% yield, need to package and test 2200 Config chips**
 - **All of the production testing can be performed within a few days**