

# Bigbite Wire-Chamber Project

Wire chambers for the Big-bite spectrometer are currently being built at UVA

## People Involved:

- Vladimir Nelyubin working full time
- Nilanga Liyanage, Bogdan Wojtsekhowski, Richard Sutter (designer), Richard Lindgren
- Students: Brandon Craver, Sachin Kandhari, Andrew Puckett

## Features:

- Drift chambers instead of MWPC to meet resolution requirements of Gen
- Extra-thin chamber to minimize multiple-scattering as required by Ch.PT and other hadron-detecting experiments
- New techniques to string wires and stretch foil

# What do we build?

- **Three drift chambers:**
  - **1<sup>st</sup> and 3<sup>rd</sup> chambers**
    - 2u,2v,2x planes
    - Resolution  $\sim 200 \mu\text{m}$
  - **Middle chamber**
    - u and v planes
    - Resolution  $\sim 1\text{cm}$ : to increase high rate and multi-track capabilities
- **Active area:**
  - **1<sup>st</sup> 140 cm x 35 cm**
  - **2<sup>nd</sup> and 3<sup>rd</sup> 200 x 50 cm (?)**
- **Sensitive wire spacing: 1 cm**
- **Anode to Cathode spacing: 3 mm**
- **Cathode foil: 12  $\mu\text{m}$  Cu-plated mylar**
- **Plans to operate the chamber with Argon bases or He based gas mixtures**

# Status of the Project

- **Wire stringing and HV frame stretching for the first chamber currently underway at UVa**
- **The completed frames are prepared to assemble and test a partial chamber, parallel to the production of other frames.**
- **Currently an extensive measurement of wire-spacing is underway**
- **Based on the results of this measurement, wire stringing will resume next week with improvements towards improved positioning accuracy.**
- **1<sup>st</sup> chamber expected to be completed by the end of November**
- **A DAQ system will be setup at UVa (with help from Bodo) in time to test 1<sup>st</sup> chamber**
- **2<sup>nd</sup> and 3<sup>rd</sup> chambers are being designed: production is expected to start next month**

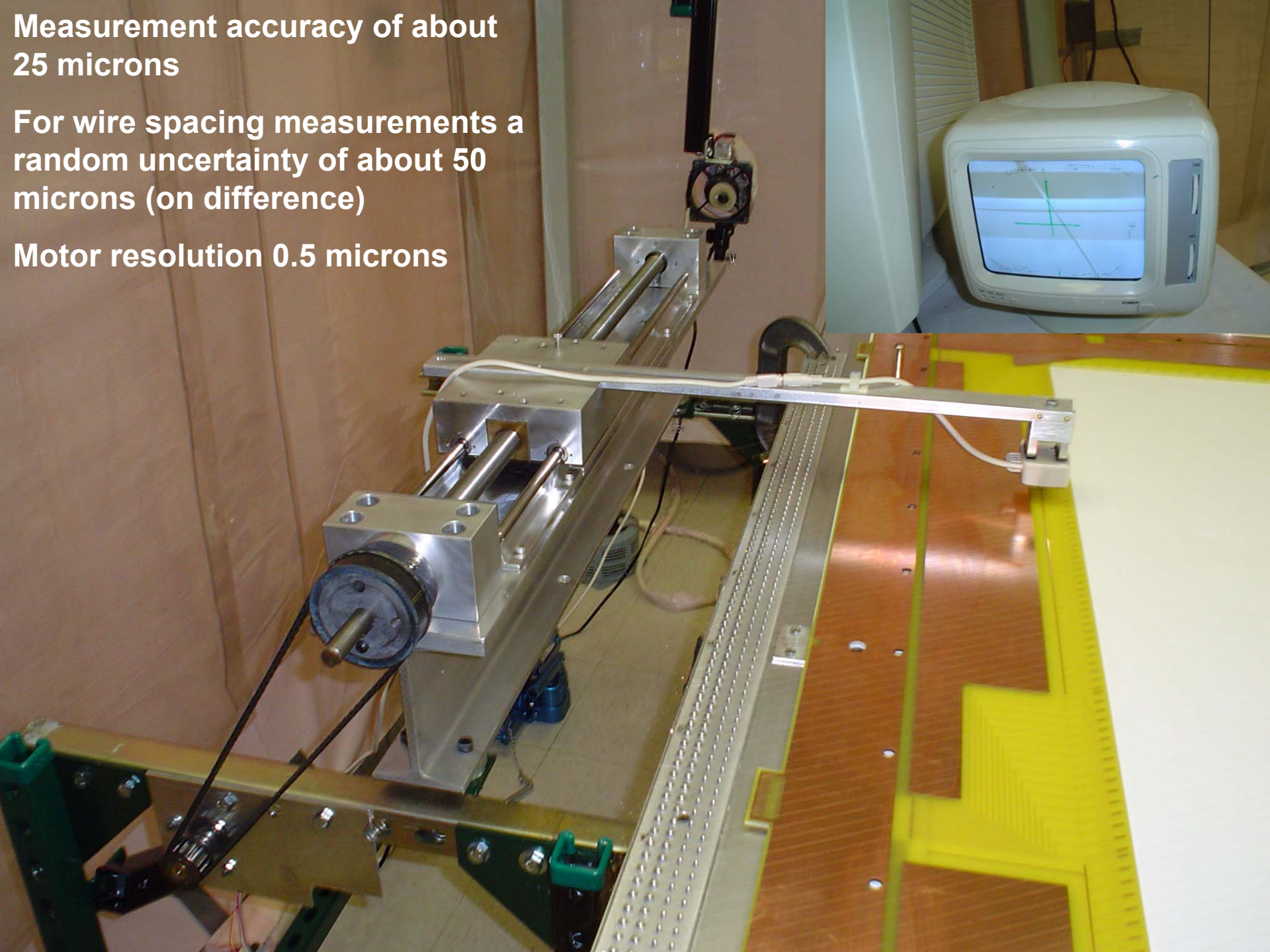
# Wire spacing measurement

- Need a “touch free” measuring device
- Precision of at least 50  $\mu\text{m}$
- Very large surface area to be measured
- Factory made instruments tens of thousands of \$\$\$\$
- Solution: A poor person’s home made measuring device

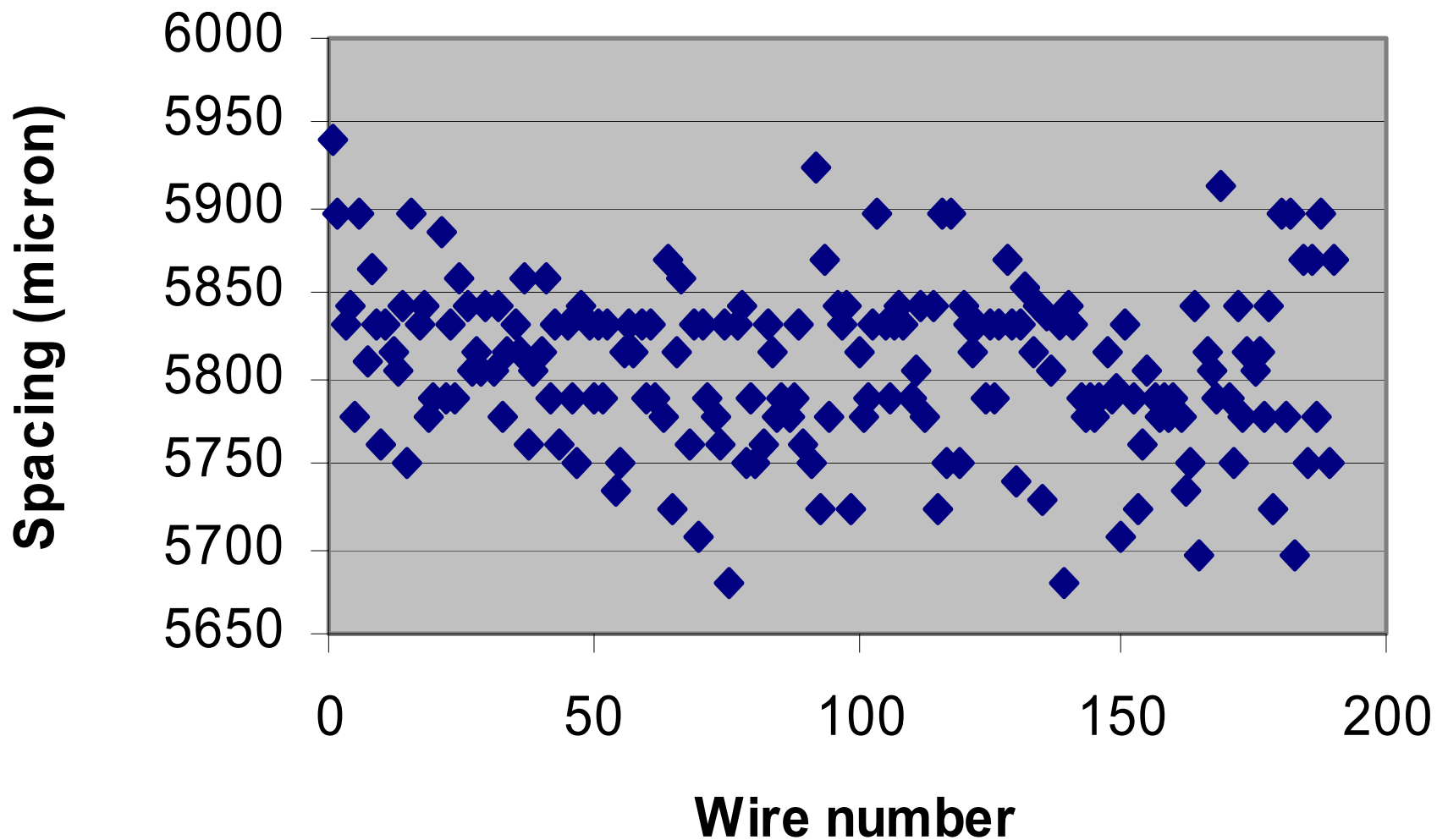
**Measurement accuracy of about  
25 microns**

**For wire spacing measurements a  
random uncertainty of about 50  
microns (on difference)**

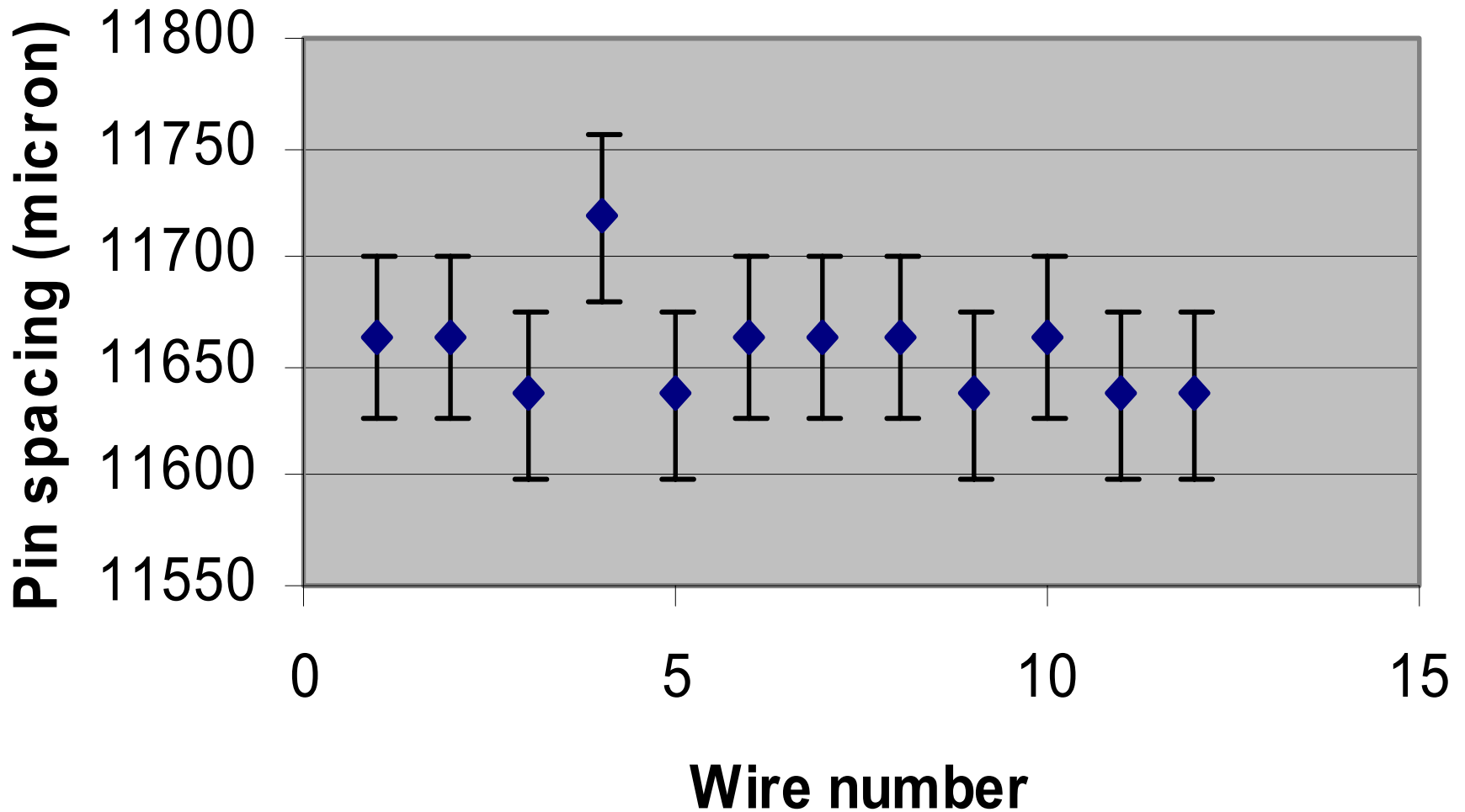
**Motor resolution 0.5 microns**



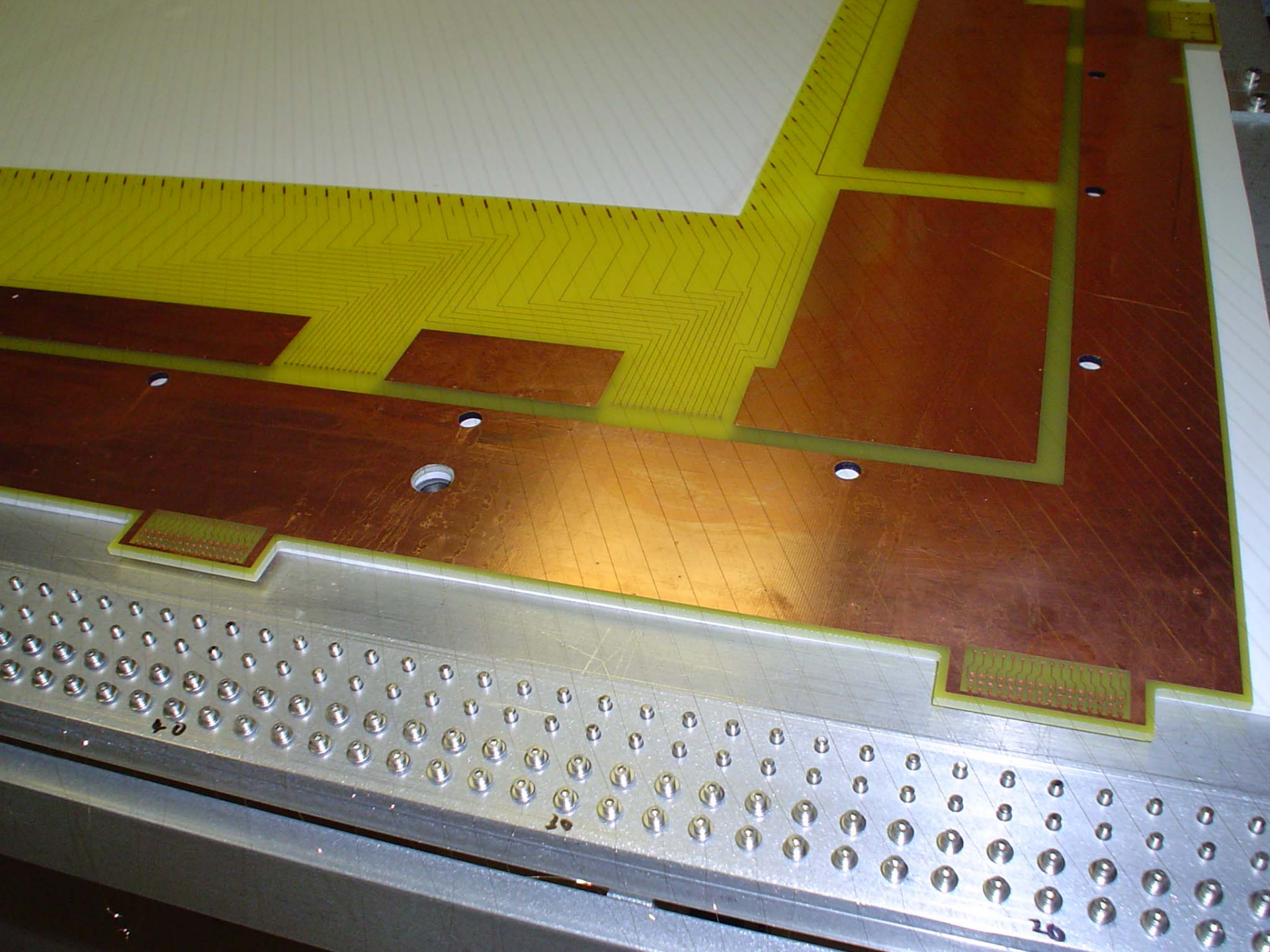
# U-Plane wire spacing



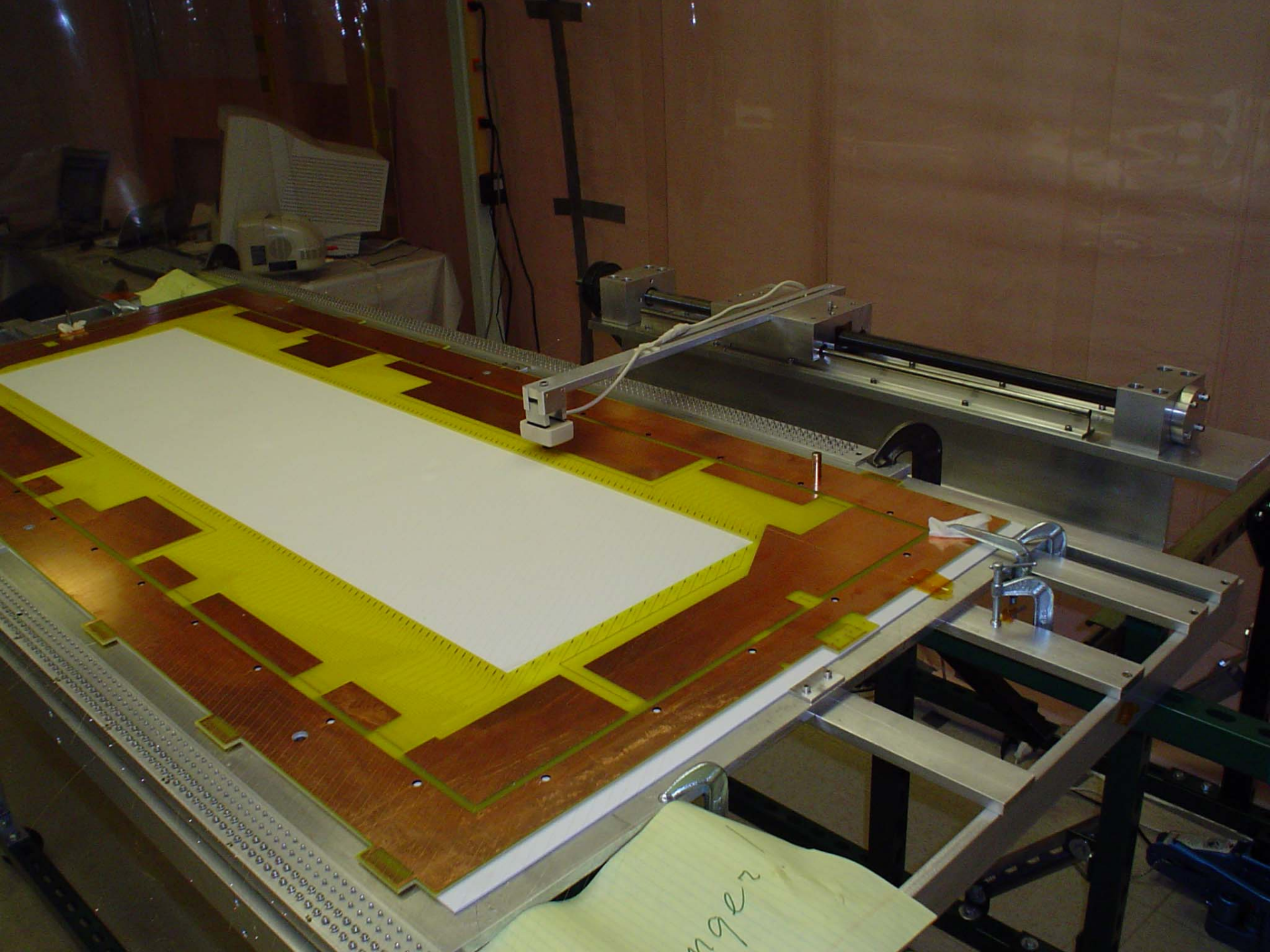
# Signal wire pin spacings











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# Bigbite Chamber Time Line

<b>BC1 design</b>	<b>Complete (September 02)</b>
<b>Order Parts</b>	<b>Complete</b>
<b>Clean room setup</b>	<b>Complete (December 02)</b>
<b>Wire-Stringing table</b>	<b>Complete (May 03)</b>
<b>HV-foil stretcher table</b>	<b>Complete (June 03)</b>
<b>BC1 Frame Manufacturing</b>	<b>Complete (February 03)</b>
<b>BC1 Frame Machining</b>	<b>Complete (April 03)</b>
<b>BC1 final construction</b>	<b>July-August 03</b>
<b>BC1 preliminary testing</b>	<b>August 03</b>
<b>BC2 design</b>	<b>August 03</b>
<b>Setup DAQ at UVa</b>	<b>October 03</b>
<b>BC1 Final testing and delivery</b>	<b>December 03</b>
<b>BC2 complete</b>	<b>February 04</b>
<b>BC2 Final testing and delivery</b>	<b>April 04</b>
<b>BC3 Delivery</b>	<b>June 04</b>