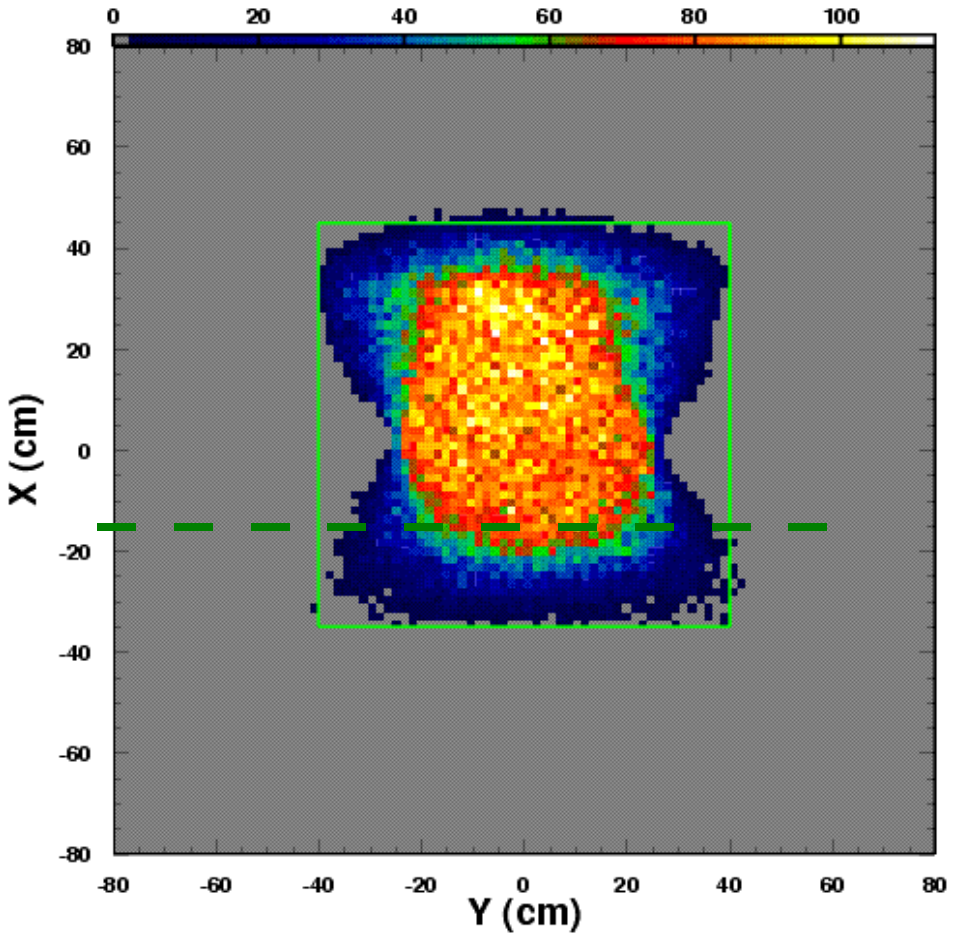
SHMS Drift Chamber Design

Drift Chamber Overview

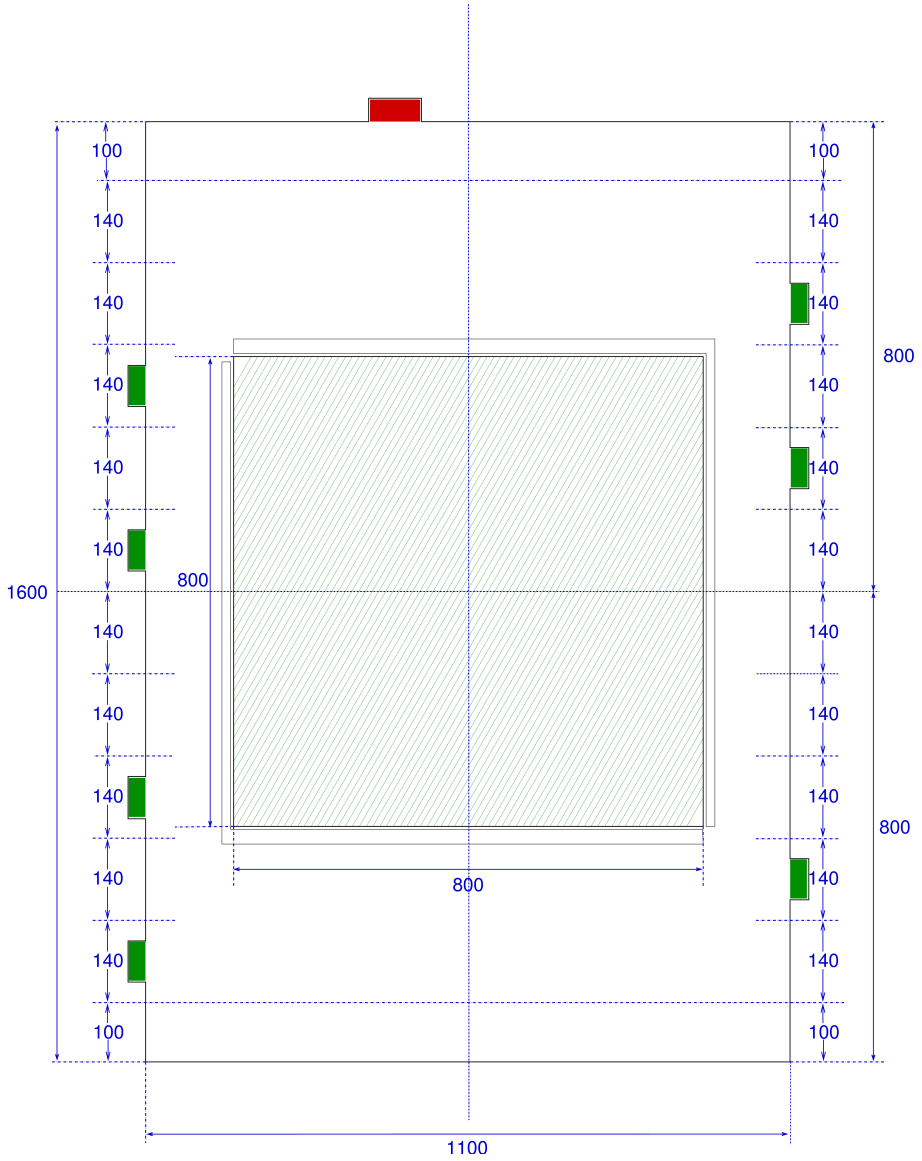
- SHMS wire chambers are an evolution of the HKS design
- Based on design and construction techniques used in SOS and HKS wire chambers
- Chamber consists of individual cathode and sense wire planes
- Six wire planes – X, X', U, U', V, V'
- Each plane is G10, 1/8” thick PCB
- Trace layout on PCB determines precision wire placement

Active Area Dimensions



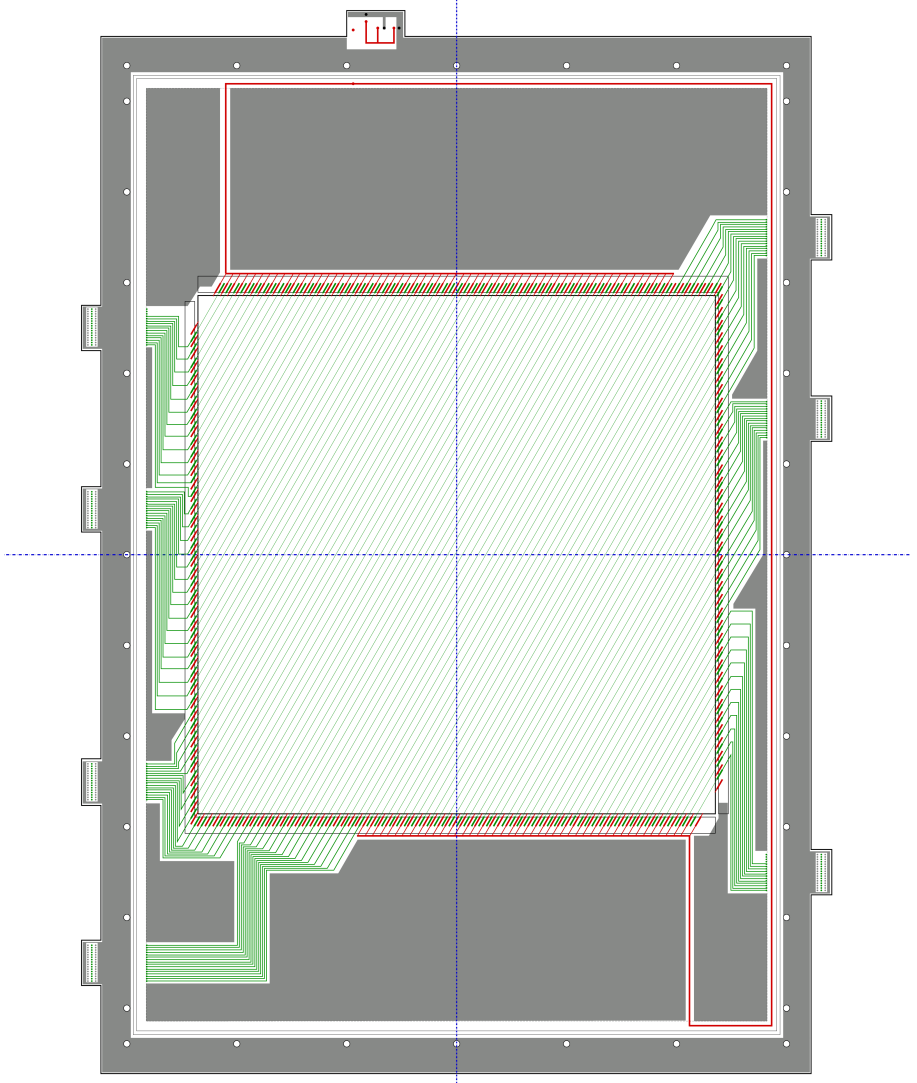
- Optics Simulation by Tania Horn
- No collimator – worst case spread
- Suggest 80cm x 80cm active area
- Asymmetric mounting about central spectrometer optical axis

Wire Chamber Dimensions



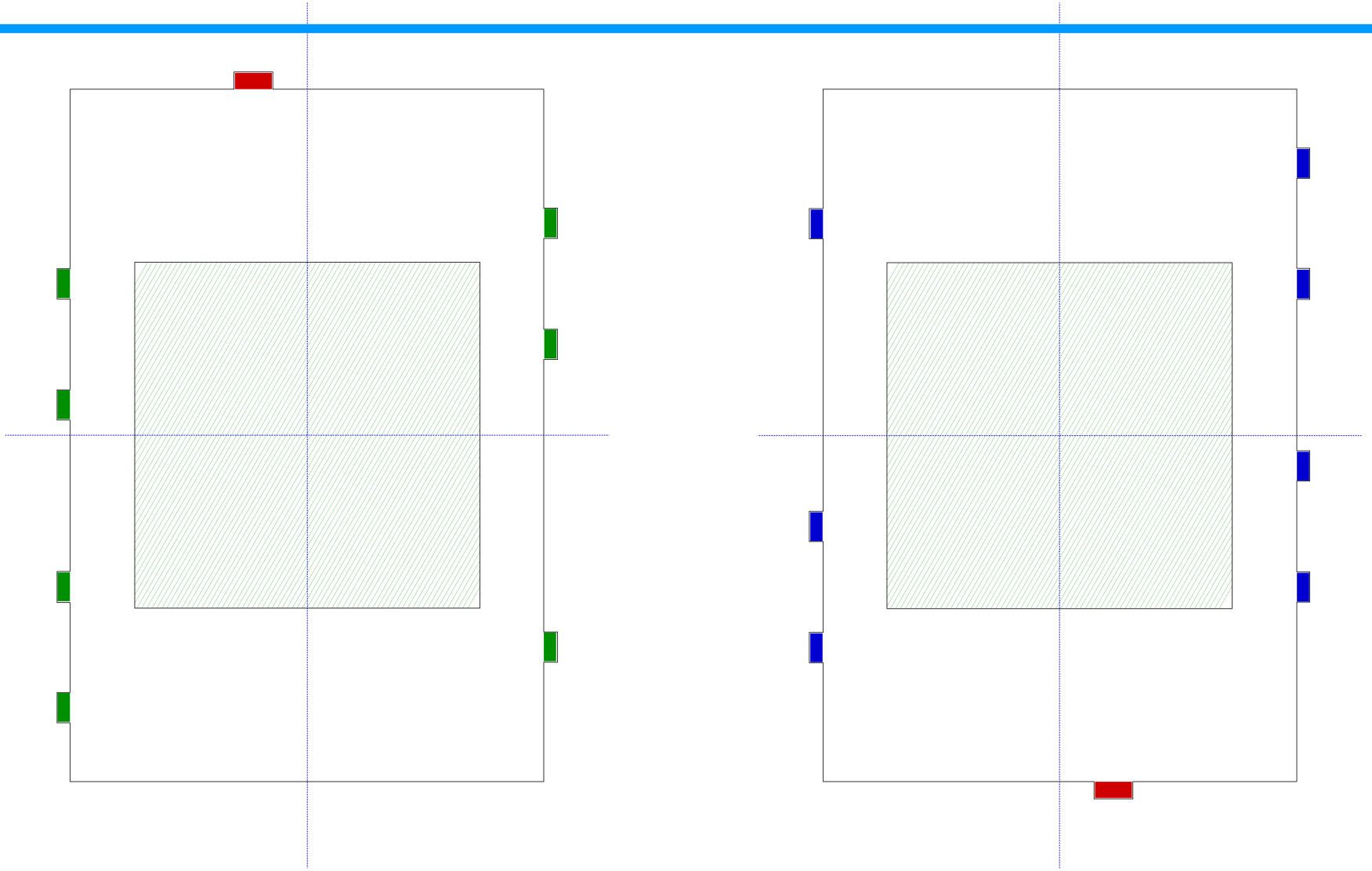
- Active area 800mm x 800mm
- Plane width = 1100mm
- Plane height = 1600mm
- Sufficient space inside detector hut
- X, X' wires horizontal
- U, U', V, V' wires ±30° to vertical
- 584 channels total
- 10mm cell spacing
- Footprint driven by number of amp/disc. cards required

Wire Trace and Board Layout



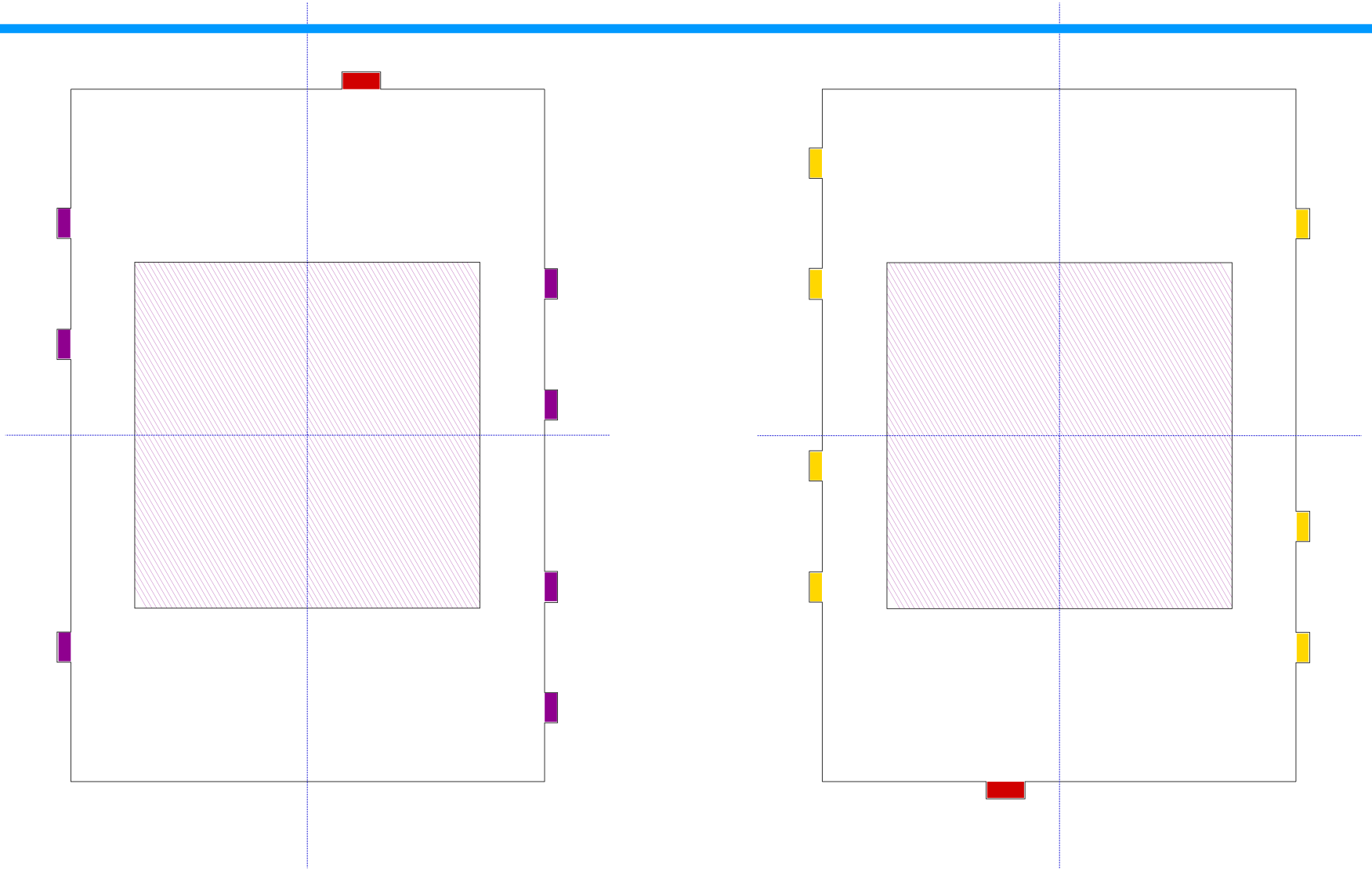
- U and U' wires at +30° to vertical
- Grounded plates on both sides
- Signal wires traced to connections for amp./disc. cards – 16 channels
- High voltage wires traced to common source

U and U' Wire Plane Pair



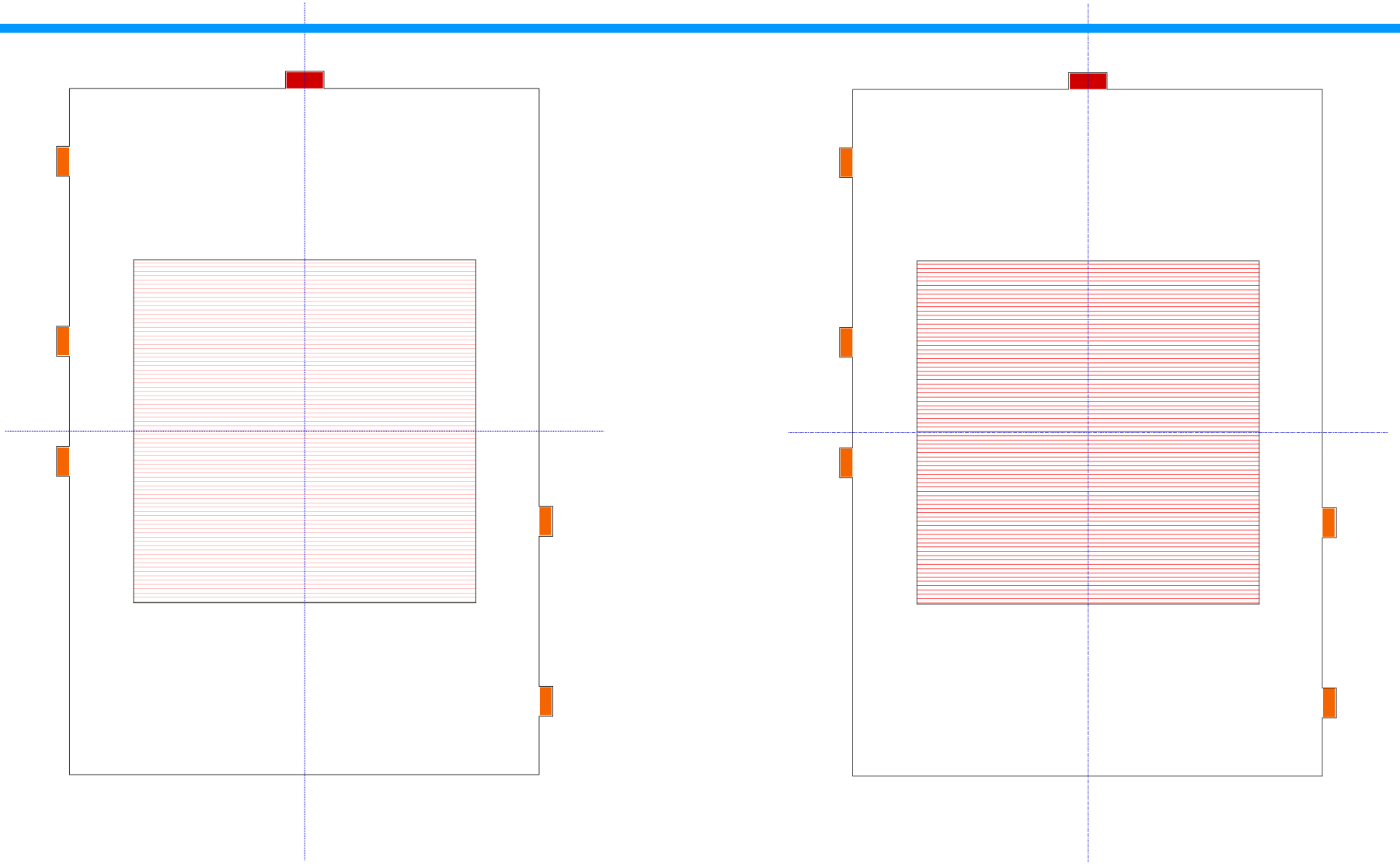
- Rotate U plane by 180° about centre axis to obtain U' plane

V and V' Wire Plane Pair



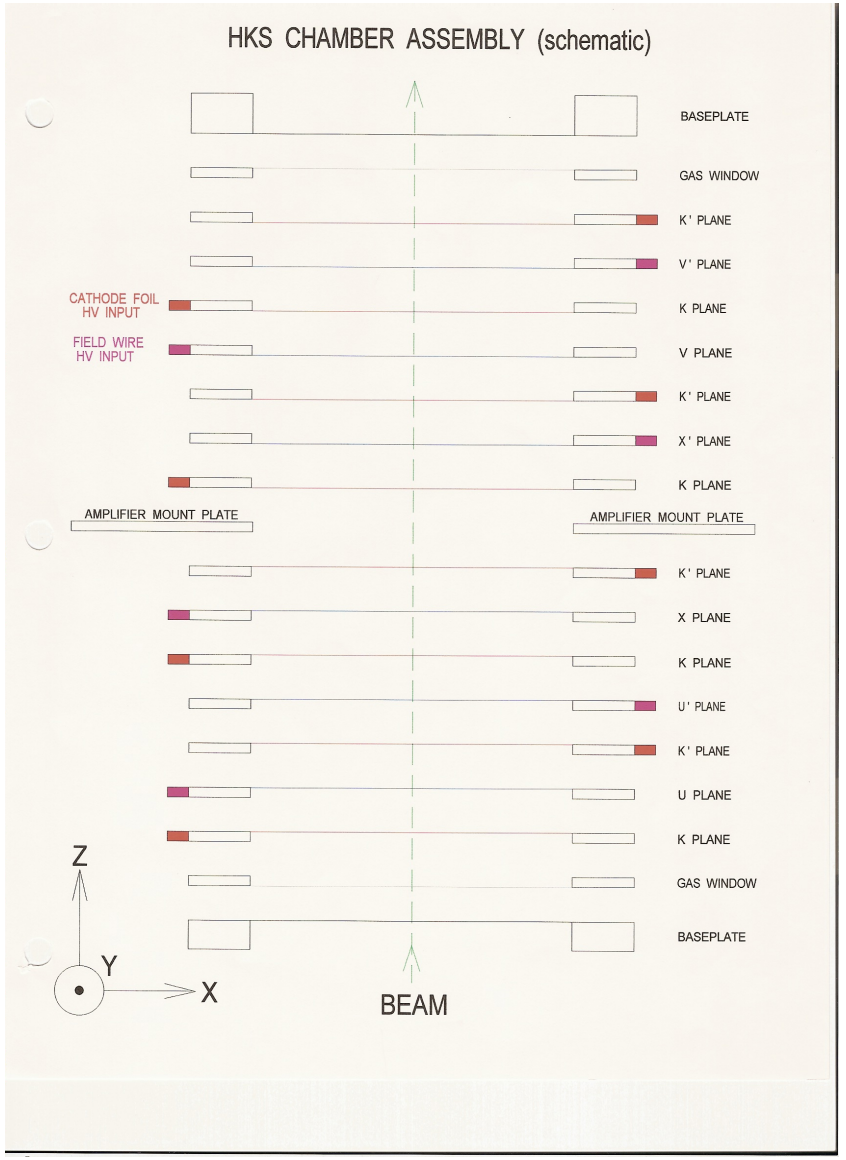
- Rotate U plane by 180° about vertical axis to obtain V' plane

X and X' Wire Plane Pair



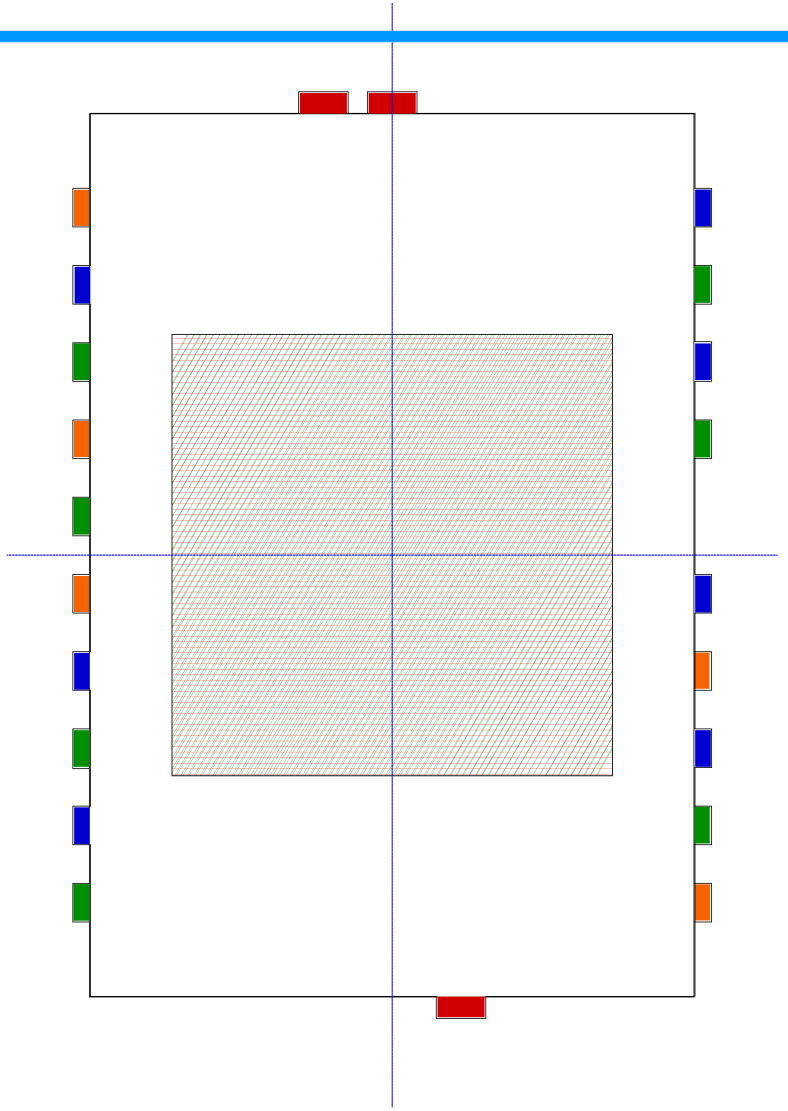
- Rotate X plane by 180° about horizontal axis to obtain X' plane

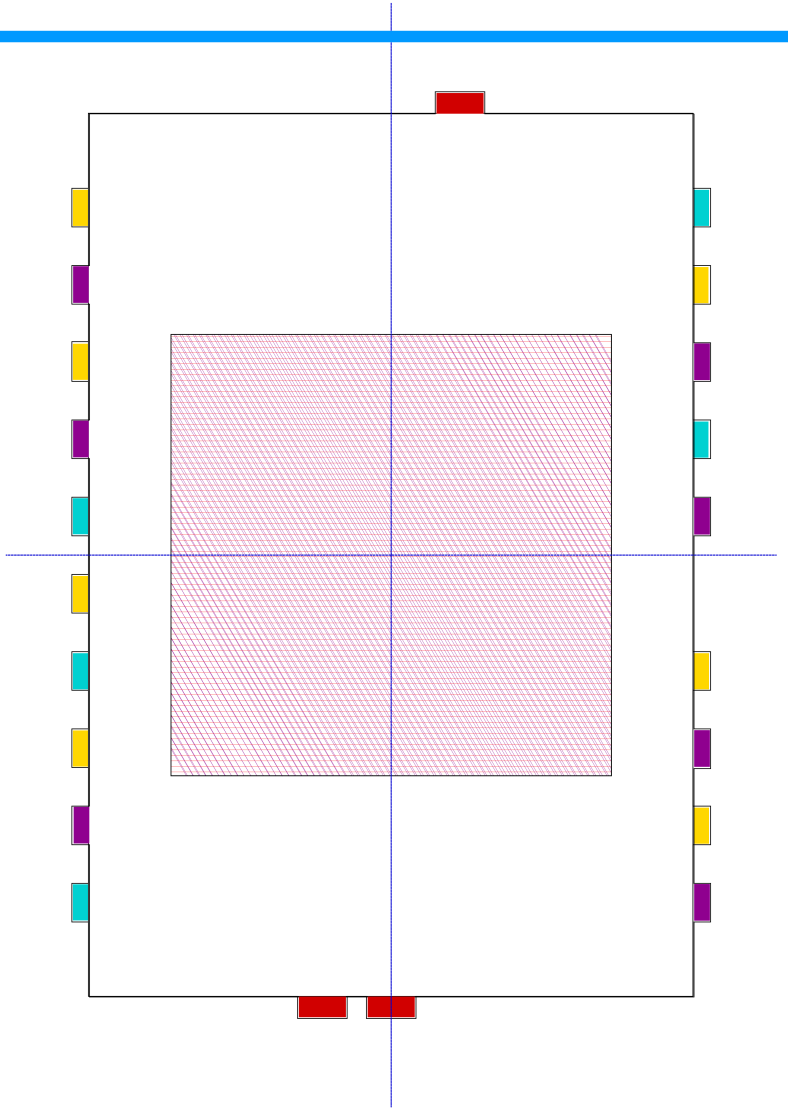
Wire Chamber Planes Order



- Alternate cathode and wire planes
- Amp./disc. cards mounted on centre plane – both sides
- Chamber symmetric about cards mounting plate
- U, U' and X cards on one side
- X', V and V' cards on other side

Overlay of Wire Plane Sets





- U, U', X – front of mount plate
- X', V, V' – rear of mount plate

Summary

Near Term Plans

- Mechanical design almost complete.
- Electrical layout of boards with all connections and traces, to begin soon.
- Clean room space at Hampton University available.
- Start testing mechanical and conductive epoxies.
- Web page for wire chambers online soon.