Addendum to
EIC Proposal for R&D of Micromegas Detectors

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Based on further research and discussions with various people, including the PCB manufacturing firm Tech-Etch, we have decided to retreat from our proposal to develop a lithography facility at MIT-Bates. We still believe it is important to acquire first-hand experience in the design and production of micromegas detectors. This will be crucial for optimizing future detector designs. But we now believe that the lithography process itself can be simplified so that any reasonably advance PCB manufacturer can produce the required PCBs with pillars and resistive layers.

To achieve this we propose to develop and investigate;

- alternative schemes for supporting the wire mesh so that the mesh is no longer part of the lithography process. This can be done by:
  - externally holding the mesh as proposed for the ATLAS upgrade,
  - fixing the wire mesh to the pillars in a separate step after the pillars are produced, or
  - producing the pillars as part of the wire mesh.
- methods for producing resistive lines or layers using standard lithographic procedures, and
- different readout schemes and how to optimize these for the physics requirements of the detector being considered.

Table 1: Revised budget request including overhead.

Item	2015	2016	2017
Equipment and consumables			
XY table, controller, dispensor	30.0 k$	30.0 k$	
PCBs, wire, foils, etc.	73.1 k$	91.4 k$	109.7 k$
Travel			
2 engineers, RD51 week	11.0 k$		
Manpower			
Engineer	0.2 FTE	0.2 FTE	0.2 FTE
	38.6 k$	39.8 k$	41.0 k$
Technician	0.2 FTE	0.2 FTE	0.2 FTE
	39.0 k$	40.2 k$	41.4 k$
Total	201.7 k$	201.4 k$	192.1 k$

By removing the need for a full lithography facility at MIT-Bates a significant fraction of the equipment requested in the first version of this proposal is no longer required. This also allows a reduction in the manpower as the engineering and technical support to design and assemble a lithographic facility is removed. Similarly, we have reduced the travel budget because we no longer see a strong need to get experience in the lithographic processes. However, we would like to retain the visits to CERN to participate in the regular RD51 mini-weeks to stay abreast of new developments with micromegas and other micro-pattern gas detector technologies.

To achieve the revised objectives for this project we retain the large XY table previously discussed in terms of an LDI facility. But now this will be used to explore adding pillars to the wire mesh (*i.e.* 3D printing), dispensing resistive ink lines, and producing large area, 0.5×2.0 m^2 micromegas detectors.

The revised budget request is summarized in Table 1 including overhead charges for the three years.