Risk Title	Mitigation	Residual risk likelihood	Residual schedule impact	Residual technical impact	Low cost impact	Likely cost impac	High cost impact	Low Schedule impact	Likely Schedule impact	High Schedule impact	Overall impact score (residual)
Micromegas Parts Delivery Delay (e.g PCB)	Contacted different supliers and ordered first PCBs for inspection	Possible	Moderate		20	30	60	2	4	6	Moderate
Micromegas Detector Delivery Delay	Choose robust, well tested Micromegas design. No R&D required.	Possible	Moderate		0	0	0	2	4	6	Moderate
FEE											
FEE/DAQ parts (boards, FELIX, fibers, EDBC) are late	Use same as TPC	Unlikely	Low		0	0	0	1	2	3	Low
LV Power Supply, distribution, cables) are late	Use same as TPC	Unlikely	Low		0	0	0	1	3	6	Low
FEE to detector transition board	Close collaboration with SAMTEC to design custom PCB+FLEX	Possible	Moderate		0	0	0	2	4	6	Moderate
FEE Cooling plates R&D and delivery is delayed	New design needed. Build on TPC studies. Expect simpler design as for TPC	Unlikely	Low		0	0	0	1	2	3	Low
FEE Housing R&D and procurement is delayed		Unlikely	Low		0	0	0	2	3	4	Low
Detector, FEE to DAQ Chain test	Same as TPC. Participate to TPC FEE to DAQ chain tests. Have plan B to decouple electronics from detector.	Possible	Moderate		0	0	0	2	4	6	Moderate
Detector + FEE + Housing assembly test is not succesful	Have the same team design Detector, FEE transition board and FEE housing (CEA)	Unlikely	Low		0	0	0	2	3	4	Low
Other services											
Gas Mixing Chamber design and construction is delayed	Refurbish PHENIX TOF-W mixing chamber	Unlikely	Low		0	0	0	2	3	4	Low
Gas Monitoring design is delayed	Benefit from experience with flammable gas in PHENIX	Unlikely	Moderate		50	100	200	2	4	6	Low
Detector + Gas system test is not succesful		Unlikely	Low		0	0	0	2	3	4	Low
HV Power Supply, distribution and cables availability is delayed	Use same HV PS as for ATLAS NSW. Use standard cables, have them assembled at SBU workshop	Possible	Moderate		0	0	0	2	4	6	Moderate
HV Monitoring	Use same HV PS and monitoring as ATLAS NSW	Unlikely	Low		0	0	0	0	1	1	Low
Detector + HV test is not succesful	Use same HV PS and monitoring as ATLAS NSW	Unlikely	Low		0	0	0	1	2	3	Low
Cooling System Monitoring	Use same as TPC	Unlikely	Low		0	0	0	0	1	1	Low
Mechanical Integration											
Mechanical Support Structures R&D and delivery is delayed	Have engineer team familiar with sPHENIX apparatus, in close contact with BNL team	Possible	Moderate		100	200	250	4	6	10	Moderate
Detector to support structure assembly test	Practice dry run with prototypes or dummy detectors	Possible	Moderate		0	0	0	2	4	6	Moderate
Support structure to EMCAL integration test	Keep close collaboration with EMCAL and TPC teams. Have them validate our design as early as possible	Possible	Moderate		0	0	0	2	4	6	Moderate
Installation											
EMCAL readiness for TPOT installation	Monitor EMCAL assembly and installation schedule	Unlikely	Low		0	0	0	1	2	3	Low
TPOT readiness for installation	Monitor TPOT assembly and installation schedule	Possible	Moderate		0	0	0	2	4	6	Moderate
Detector is broken during installation	Have spare detectors available, practice dry run with prototypes or dummy detectors	Rare	Low		0	0	0	0	3	6	Low

TPOT Operations											
TPOT Performance (resolution, efficiency, HV trips) are poorer than anticipated	Precise in-lab detector characterization before commissioning, have confortable margins on detector requirements (efficiency, resolution). Have resonably segmented detector to limit acceptance losses in case of problems										Moderate
Particle rates/multiplicity are higher than anticipated	Detector and DAQ should sustain high rates/occupancy. Have comfortable margins on detector requirements (efficiency, resolution). Detailed simulations to study matching efficiency/purity to TPOT. Possibility to drop most central collisions										Low

Risks to sPHENIX											
Sphenix installation delay due to TPOT	Agreed with BNL that TPOT must not delay sPHENIX: "If the components are not ready to meet sPHENIX schedule, including meeting milestones for design work, the TPOT will not be installed"										Low
Electronic noise from TPOT	Careful design of ground connections, decoupling from other detectors, EM shielding around FEE board, around detector										Low
Local temperature variations in TPC	Only FEE generate heats. Shielded by detector Need detailed FEE cooling studies, FEA										Low
Degradation of EMCAL performances due to additional material	Detector + FEE rad. length < 10%x_0 Need detailed study including support structure and cables Expected low impact wrt TPC support. Can control online by comparing regions of acceptance w, w/o TPOT										Low
FEE cooling water leaks	Water cooling system identical to TPC. Operated in sub atmospheric pressure										Low
Gas Flammability	Gaz mixture at the detector has low flammable gas fraction. Foresee sniffers around the TPOT detectors. Equip gas barrack to handle flammable gases, based on experience with PHENIX										Low
Data volume	Anticipated data volume is ~2% of that of the TPC										Low
TPOT failure, (detector, FEE)	No impact on current sPHENIX capabilities. Will make calibration of the TPC more difficult, take longer										Low