Tracking			
Component	Technology	Challenge considerations	Alternatives & Mitigation
Si-trackers, vertex layers	Extremely thin (0.05% X/X_0 per layer) curved MAPS in 65 nm technology and pixel size $\mathcal{O}(10\,\mu\text{m})$	Development mainly for ALICE ITS3 upgrade; large international and inter-laboratory synergies; synergies within EIC community via the Silicon Consortium; highly innovative: **Maturity Level of the Technology: 6**	ITS3 fall-back solution in 180 nm technology with fully depleted MAPS and 50 μm thickness; other alternative: existing ALICE MAPS (ALPIDE) in 180 nm technology: the reduction in performance (tracking, p measurement) is tolerable for large part of the EIC physics program.
Si-trackers, barrel layers and disks	Same sensor technology as for vertex mounted on staves because of size and yield issues; with this arrangement: 0.55% X/X_0 per layer	Same as for vertex	Same as for vertex
Cylindrical Micromegas	Curved MICROMEGAS	Curved MICROMEGAS of smaller size than what is needed for ATHENA are already in operation at CLAS12 at JLab; **Maturity Level of the Technology: 8**	Fall-back option: detector segmentation; Cylindrical GEMs (KLOE2); approximation of the cylindrical shape by small flat chambers
Planar GEMs	Large-size GEMs	Large GEMs of comparable size are under construction for the upgrade of the CMS muon system and large-size chambers have been validated with test beam studies; **Maturity Level of the Technology: 9**	Fall-back option: detector segmentation; different technology using large-size MICROMEGAS (ATLAS New Small Wheels)
μRWELL	large-size μRWELL	μRWELL never used in an experiment, foreseen in LHCb upgrade; considered also for SOLID and CLAS12 upgrade at JLab; **Maturity Level of the Technology: 7**	Alternative is using different gaseous detector technologies: GEM, MICROMEGAS, sTGC

Table 1: Challenges and mitigation policies for tracking technologies.

Calorimetry			
Component	Technology	Maturity	Alternatives & Mitigation
HCal (Forward, Barrel, Backward)	HCal Fe/Sc sandwich	Well establish technology with recent up-to-date implementations as STAR forward HCal; **Maturity Level of the Technology: 9**	Further studies to optimize the layout details needed
EMCal, forward		Wpowder/SciFiCal with SiPM sensors; going to be used in sPHENIX; **Maturity Level of the Technology: 10**	No need
EMCal barrel	Hybrid calorimeter with front imaging layers using AstroPix sensor alternated with PB/SciFi layer followed by a set of Pb/SciFi layers	Innovative design that can result in performance uncertainties, while the needed technologies, namely Pb/SciFi calorimetry (most recently: GLUEX) and AstroPix are established; **Maturity Level of the Technology: 9**	Further studies for performance confirmation needed
EMCal backward	Center equipped with $PbWO_4$ crystals, peripheral area by novel scintillating glass	$PbWO_4$ crystals: procurement uncertainties; scintillating glass: novel development specific for EIC already well advanced; synergies within the EIC community exploited by the EEEMCAL consortium; **Maturity Level of the Technology: 7**	For crystals: anticipate the market survey and purchasing; for scintillating glass, consider alternative technologies as lead-glass (possibility of reused material)

Table 2: Challenges and mitigation policies for calorimeter technologies.

Particle Identification			
Component	Technology	Maturity	Alternatives & Mitigation
dRICH (forward), global design	Combination of gas and aerogel in a large acceptance focusing RICH in magnetic field	Two-radiator RICHs already operated in experiments (HERMES, LHCb); **Maturity Level of the Technology: 9**	No need
hpDIRC (barrel), global design	DIRC concept enpowered by focusing element and fine-pixel read-out	Focusing RICH [NIMA 775 (2015)112] extensively developed and confirmed by test beam for PANDA at GSI; principle of hpRICH (more refined focusing by lenses) demonstrated with optical studies; **Maturity Level of the Technology: 10**	No need
pfRICH (backward), global design	Proximity focusing RICH with aerogel radiator and large proximity gap for fine resolution	Proximity focusing demonstrated by RICH in various experiments (ALICE HMPD); aerogel as RICH radiator demonstrated (HERMES, LHCb, BELLE II, CLAS12); **Maturity Level of the Technology: 10**	No need
Photosensors by SiPMs (for dRICH and pfRICH)	SiPMs at low temperature ($\sim -40°C$)	The validation of the approach is via a dedicated detailed R&D program including the study of the dark current versus irradiation dose and versus repeated thermal annealing cycles; SiPMs selection by characterizing devices by different providers; highly innovative approach: **Maturity Level of the Technology: 6**	Continue pursuing the development of an alternative approach by large-size MCP devices: LAPPDs; as both the baseline choice (SiPM) and the alternative option (LAPPD) are not established, globally this item requires management attention, adequate support and investment
Photosensors by MCP-PMTs (for hpDIRC)	Commercial 1-inch MPC-PMTs (most likely by PHOTONIS)	Challenges arise from the production rate and cost; **Maturity Level of the Technology: 10**	Early purchasing procedure; continue pursuing the development of an alternative approach by large-size MCP devices: LAPPDs
radiator gas (for dRICH)	C_2F_6	Procurent difficulties and increasing cost due to increasing restritions (world-wide) due to the extremely high Global Warming Potential (GWP); demanding gas recirculation plant required. **Maturity Level of the Technology: 7**	Develop the approach by pressurized Argon to replace the use of fluorocarbon gas
Aerogel (for dRICH and pfRICH)	Low refractive index (1.02) aerogel	The homogeneity and yield in the production of hydrophobic or hydriphilic low refractive index aerogel has to be demonstrated as well as the production rate. **Maturity Level of the Technology: 7**	Develop the low refractive index aerogel together with more than a single producer; early purchasing
Fused silica bars (for hpDIRC)	Fused silica bars with high precision mechanical parameters and very fine surface polishing; re-use of BABAR material expected	A detailed protocol for BABAR bar disassembly to be established; a protocol for barrel assembly according to ATHENA needs to be established; **Maturity Level of the Technology: 9**	Guidance from BABAR and PANDA experience
Barrel TOF	Sensors: AC-LGAD	Dedicated development, already advanced at present time; synergies with other proposed applications: ATLAS roman pots for HL-LHC, LHCb upgrade, ALICE3, NA62, CERN, PIENUX, TRIUMF and space missions PAN. **Maturity Level of the Technology: 8**	Continue pursuing the development of an alternative approach for PID at low momenta to complement PID by DIRC in the barrel: R&D dedicated to a miniTPC with sensors by GridPix technology

Table 3: Challenges and mitigation policies for particle identification technologies.

Far-Forward Detectors			
Component	Technology	Maturity	Alternatives & Mitigation
B0, Roman Pots, Off-momentum detectors	Sensors: AC-LGAD	See comments for AC-LGAD in Table 3	Consider alternative technologies as a combination of pixel and timing layers
ZDC	Electromagnetic component: W-powder/SciFi; hadronic component: Pb/scintillator with imaging layers by Pb/SciFi	Established technologies; **Maturity Level of the Technology: 10**	No need
Far-Backward Detectors			
EMCal	Radiation-hard scintillating fibres, with quartz fibers to SiPM sensors	Established technologies; **Maturity Level of the Technology: 10**	No need
Hodoscopes	SciFi's with SiPM sensors	established technologies; **Maturity Level of the Technology: 10**	No need

Table 4: Challenges and mitigation policies for technologies deployed in far-forward and far-backward detectors.