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Designing the second interaction region and detector

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In its report, the DPAP observed that "there is significant support in the community and from the panel for a second general-purpose detector system to be installed in IR8 when resources are available." Such a detector would unlock the full discovery potential of the EIC by providing cross checks of results from ePIC, and reduce the combined systematic uncertainties. And in combination with a novel IR design, it could provide new and unique physics opportunities. In particular, the 2nd focus that has been incorporated into IR8 will greatly enhance far-forward detection, making it possible to detector protons and light nuclei all the way down to p_T = 0, and significantly improve the ability to detect nuclear breakup. The latter would enhance the ability to veto breakup in exclusive and diffractive scattering on nuclei, and even make it possible to study the level structure (gamma spectroscopy) of isotopes produced in electron-ion collisions. Improved veto efficiency would make measurements like coherent diffraction on heavy nuclei much less challenging, and open the way for coherent DVCS not only on He, but also heavier nuclei such as ^{12}C, ^{16}O, or even Ca, and in the future maybe polarized ^{7}Li.The combination of excellent low-t acceptance and coverage of the low-Q^2 region in-between photoproduction and 1 GeV^2, could also open up the possibility to study the elusive but important double-DVCS process at lower x, where rates are high. To fully take advantage of these and other new opportunities, the design of the IR and central detector should from the outset be designed to maximize the synergies. For instance, a higher magnetic field and improved tracking resolution would help studies of coherent diffraction, a high-resolution barrel EMcal would be important for DVCS on nuclei, and purpose-built and fully optimized muon detection would be necessary for double-DVCS - but also advantageous for, *e.g.*, charmonium production.

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