**Comparison of Various Immunoassay Platforms**

| **Platform**  **Feature** | **ELISA** | **ImmunoCAP** | **Luminex**  **/ MSD** | **NOVEOS** | **CyTOF**  **(Mass Cytometry)** | **Flow Cytometry** | **⭐ FocalTuning ⭐** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assay** | Plate-based, colorimetric | Sponge-based, fluorescent | Bead/spot-based, fluorescent or ECL | Bead-based, chemiluminescent | Cell-based, metal isotope mass detection | Cell/bead-based, fluorescent | Bead-based, flow + fluorescence or isotope |
| **Negative Control** | Buffer-only blank wells | Non-target–coated sponges | Single control bead per well | Dual beads: target + blank | None or external cell population | Isotype antibody controls | Paired control bead for each analyte |
| **Background Correction** | Global; no matrix adjustment | Non-target sponge; may mismatch | Intra-well, shared control | Intra-sample, per well | No built-in correction for soluble targets | Isotype mismatch common | ✅ Intra-sample, per-analyte |
| **Data Granularity** | Per well | Per sponge | Per bead type, per well | Per well | Per cell | Per cell or bead | ✅ **Per bead** |
| **Analyte-Specific Background Subtraction** | ❌ | ❌ | ❌ | Partial (dual beads) | ❌ | ❌ | ✅ **Yes** |
| **Statistical Power** | Low | Low | Moderate | Moderate | High (per-cell), not optimized for soluble quantitation | Moderate | ✅ **High** |
| **LOD** | ~10–100 pg/mL  (0.004-0.04kU/L) | 0.24-2.4 ng/mL  (~0.1–1 kU/L) | ~1–10 pg/mL  (0-0.004kU/L) | 0.24-0.48 ng/mL  (~0.1–0.2 kU/L) | ~100–1,000 antibody molecules/cell (not calibrated in pg/mL) | ~1–50 pg/mL  (0-0.02kU/L) | ✅ **Lower pg/mL** *(fluorescence, <0.2kU/L)*  🚀 **Potential fg/mL** *(with metal tags)* |
| **Multiplexing Capability** | Low (1–3) | Low (1) | High (20–80) | Low (1 per well) | Very High (40–50+) | Moderate (10–15) | ✅ **High** |
| **Automation** | Limited | Automated | Automated | Fully automated | Semi-automated | Manual to semi-auto | ✅ Manual or automated |
| **Best Use Case** | Simple assays, high-abundance targets | Allergen sIgE testing | Cytokine profiling, moderate throughput | Clinical allergy testing | High-dimensional immune profiling | Immune cell phenotyping | ✅ Precision diagnostics & research |