

Machine Learning rediscovers flow in simulated data of heavy ion collisions

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We apply principal component analysis (PCA) to simulated data of relativistic heavy-ion collisions. Unlike traditional Fourier methods, we apply PCA directly to single particle distribution. Interesting patterns are identified by PCA as eigenmodes, from which we define new flow observables v'_n compared to traditional ones v_n . The eigenmodes are very much like traditional Fourier bases, but are slightly different. Further research shows that v'_n are mutually more independent than v_n . We then relate v'_n to initial eccentricity ε_n , finding v'_n do have more linearity with ε_n than v_n with ε_n . This might be a signature that relativistic hydrodynamics is not as non-linear as we originally thought. With new bases chosen by PCA, the correlations between different harmonics drop significantly.

Type

Parallel talk

Sessions (parallel only)

Heavy Ions

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