Universal Bounds for Large Determinants from Non–Commutative Hölder Inequalities in Fermionic Constructive Quantum Field Theory

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Abstract: Efficiently bounding large determinants is an essential step in non–relativistic fermionic constructive quantum field theory, because, together with the summability of the interaction and the covariance, it implies the absolute convergence of the perturbation expansion of all correlation functions in terms of powers of the strength $u \in \mathbb{R}$ of the interparticle interaction. For large determinants of fermionic convariances, *sharp* bounds which hold for *all* (bounded and unbounded, the latter not being limited to semibounded) one–particle Hamiltonians can be derived.

I will explain in particular how one finds the smallest *universal determinant bound* to be exactly 1. In particular, the convergence of perturbation series at $u = 0$ of any fermionic quantum field theory is ensured by the decay properties of the covariance and the interparticle interaction alone. Our proofs use Hölder inequalities for general non–commutative L^p–spaces derived by Araki and Masuda.

Joint work with W. de Siqueira Pedra.