Abstract : Generalisations of the FKG inequality and connections with group representation theory. Ken Johnson

The FKG inequality states that under certain positivity assumptions if f_1 and f_2 are random variables then $\mathbb{E}(f_1 f_2) - \mathbb{E}(f_1)\mathbb{E}(f_2) \geq 0$, where $\mathbb{E}(f)$ is the expectation of f. This inequality has numerous applications in statistics, mathematical physics and combinatorial theory. For the "higher correlations" which statisticians use there is not a corresponding inequality, but Richards showed that for $3, 4$ and 5 the formula for the higher correlations could be modified and proved generalisations of the inequality, but his formula for $n = 6$ did not give an inequality. Then Sahi produced formulae for all n which coincide for $n \leq 5$ with those of Richards and he conjectured an infinite sequence of inequalities, but could only prove these under more restictive assumptions. My interest is that Sahi's formulae are the same as those used by Frobenius in describing the factors of a group determinant corrsponding to an irreducible character. I will discuss the question of whether the conjectured inequalities of Sahi can be given a group theoretical interpretation, which would lead to corresponding inequalities for probabilities on arbitrary groups.