Barci and Stariolo Reply: The focus of our work [1] was to identify conditions for the presence of an isotropic-nematic phase transition in the context of a generic system with isotropic competing interactions. By taking into account nontrivial angular momentum contributions from the interaction, we found a second order isotropic-nematic phase transition at mean field level, which becomes a Kosterlitz-Thouless one [2] when fluctuations are taken into account.

In his Comment [3], Levin criticizes our results by showing that the low temperature fluctuations of a stripe phase in $2d$ diverge linearly in the thermodynamic limit. His analysis is restricted to the stripe phase and, contrary to what is suggested in the Comment, does not apply to the central result of our Letter which is the existence of an isotropic-nematic phase transition. In fact, *as clearly anticipated by us in the Letter* [1], the corresponding analysis of the fluctuations of the nematic order parameter displays a logarithmic divergence leading to a low temperature phase with quasi-long-range order.

In our model, despite the involved calculations, it is straightforward to understand this fact. Introducing the nematic order parameter $\hat{Q}_{ij} = \alpha(\hat{n}_i\hat{n}_j - \frac{1}{2}\delta_{i,j})$ [where $\hat{n}_i = (\cos\theta, \sin\theta)$ is the director field] through a Hubbard-Stratonovich transformation, it is possible to decouple the quartic ϕ terms. Integrating out the ϕ field, we obtain the following long wavelength effective free energy for the nematic order parameter: $F(\hat{Q}) = (a_2/2)\mathrm{Tr}(\hat{Q}^2) + (a_4/4)\mathrm{Tr}(\hat{Q}^4) + (\rho/4)\mathrm{Tr}(\hat{Q}D\hat{Q}) + \ldots$, where the symmetric derivative tensor $D_{ij} = \nabla_i\nabla_j$ and a_2, a_4, and ρ are temperature dependent coefficients given in terms of the parameters of the original model. At mean field, the last term is zero, and we find $\alpha = \sqrt{-a_2/a_4}$ for $a_2 < 0$, going continuously to $\alpha = 0$ for $a_2 > 0$. Note that any global rotation of the order parameter costs no energy. Therefore, parametrizing the order parameter by a modulus and an angle, the long wavelength angle fluctuations $\theta(x)$ dominate the low energy physics. Computing the free energy at lowest order in the derivatives of the angle fluctuations, we find $\Delta F = \rho\alpha^2 \int d^2x|\vec{\nabla}\theta|^2$, where ΔF is the excess of free energy relative to the saddle point value. Therefore, the free energy of fluctuations corresponds to that of the XY model. The only difference with the usual vector orientational order is that the system should have the symmetry $\theta \to \theta + \pi$ modifying the vorticity of the topological defects. Thus, one finds for the angle fluctuations $\langle\theta(x)\theta(x')\rangle \sim \ln[k_0(x - x')]$, which in turn lead to an algebraic decay of the order parameter correlations. In an extended paper we will show the explicit dependence of the Frank constant $K(T) = \rho\alpha^2$ with the parameters of our model k_0, m, u_0, and u_2. The conclusion is that the isotropic-nematic transition takes place by the Kosterlitz-Thouless mechanism of vortex (disclination) unbinding [2]. This result agrees with the predictions of the well-known Kosterlitz-Thouless-Halperin-Nelson-Young (KTHNY) theory that predicts the same kind of transition in a layered two-dimensional system [4]. The main difference between our work and the KTHNY theory is that while KTHNY begin the analysis from an elastic energy valid at low temperatures already in the crystal phase and explicitly add a term to take into account topological defects, we approach the transition form the disordered phase, allowing the possible emergence of spontaneous symmetry breaking. In this way, we make contact with more microscopic parameters, clarifying in some way the role of competing interactions in the development of orientational phases, contrary to what is suggested in the Comment. It is well known that Ginzburg-Landau functionals similar to the one explored by us can be obtained from more microscopic interactions like those in ultrathin magnetic films [5] and copolymers in $2d$ [6].

In conclusion, we have shown that the model introduced in Eqs. (1) and (7) of Ref. [1] undergoes an isotropic-nematic phase transition in the Kosterlitz-Thouless universality class.

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