of the squeezing factor, $f_{i,j}(m, m_*)$, in the chaotic amplitude. This can be inferred from the analytical results in previous papers[1, 2, 5]. However, the strength of the squeezing effect on the two-identical particle correlation was not carefully investigated in those references.

The analytical form of the HBT correlation function is obtained by substituting the chaotic amplitude[5],

$$G_c(\mathbf{k}_1,\mathbf{k}_2) = \frac{E_{1,2}}{(2\pi)^{\frac{3}{2}}}\Big\{|s_0|^2 R^3 e^{-\frac{1}{2}R^2\mathbf{q_{12}^2}} + n_0^* R_*^3(|c_0|^2+|s_0|^2)e^{-\frac{1}{2}R_*^2\mathbf{q_{12}^2}}\; e^{-\frac{\mathbf{K_{12}^2}}{2m_*T_*}}\; e^{-\frac{\mathbf{q_{12}^2}}{8m_*T}} \exp\Big[\frac{im\langle u\rangle R}{m_*T_*}\mathbf{K}_{12}.\mathbf{q}_{12}\Big]\Big\}, \quad (5)$$

together with the spectrum given in Eq. (4), into Eq.(2). The finite emission time factor, multiplying the square modulus of Eq. (5), is now $F_c(\Delta t) = [1+(\omega_1-\omega_2)^2\Delta t^2]^{-1}$. For stressing the HBT effects in the $\phi\phi$ case, we selected the region (small $|\mathbf{q_{12}}|$) where the particle-antiparticle correlation is not significant and the HBT is relevant to Eq.(2).

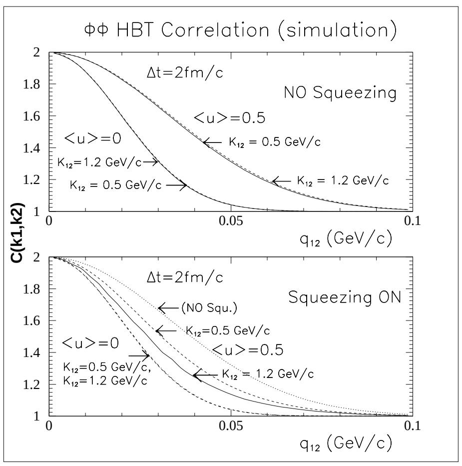

FIG. 3: The plots show the HBT correlation function in the absence of squeezing (top) and when it is present (bottom).

This is seen in Fig. 3. The top part shows the effect of radial flow alone on the HBT correlation function, while in the bottom, the joint effects of flow and squeezing are shown. We see that, without squeezing, the flow broadens the correlation curves, as expected, since the expansion reduces the size of the region accessible to interferometry. When the squeezing effects are present, they seem to oppose to the flow effects, almost canceling the broadening of the correlation function due to flow for large $|\mathbf{K}|$, another striking indication of in-medium mass modification.

CONCLUSIONS

In this work we suggest an effective way to search for the squeezed bosonic correlations in heavy ion collisions at RHIC and, soon, at the LHC. We argue that the suitable variable to experimentally search for the squeezed correlation function is the average momentum of the pair, $2|\mathbf{K}_{12}|$, the non-relativistic limit of the relativistic variable, $Q_{bbc} = 2\sqrt{(\omega_1\omega_2 - K^\mu K_\mu)}$ [6]. We show that, in the presence of flow, the signal is expected to be stronger over the momentum regions shown in the plots, i.e., roughly for $0 \lesssim |2\mathbf{K}| \lesssim 100$ MeV/c (depending on R) and $500 \lesssim |\mathbf{q}| \lesssim 1500 - 2000$ MeV/c, suggesting that flow may enhance the strength of the BBC signal, facilitating its experimental discovery. Another important result found within our simple non-relativistic model is that the squeezing could also distort the HBT correlation function, leading to effects opposing those of flow, almost neutralizing it for large values of $|\mathbf{K}_{12}|$. For emphasizing the dramatic effects induced by in-medium hadronic mass modification on the correlation functions, we chose a constant mass-shift that leads to the maximal intensity, based on results of Fig. (2). For $\phi\phi$ mesons, this corresponds to $m* \approx 1$ GeV, roughly a 2% reduction in the ϕ mass, as compared to its asymptotic mass ($m = 1.02$ GeV). As stressed before, a more realistic treatment should consider a detailed prescription for the mass modification, based on models that predict its dependence on the particles' momenta and its distribution in the hot and dense system.

The above procedure is also applicable to other particles, such as kaons. The corresponding results [9] are discussed in Ref. [10]. Finally, it is important to note that all the effects shown here should exist only if the particles have their mass modified in the hot and dense medium. If no modification happens, the squeezed correlation functions would be flat unity, and the HBT correlation functions would behave as usual. However, if the particles' masses are indeed modified, the experimental discovery of squeezed particle-antiparticle correlation (and the distortions pointed out in the HBT correlations) would be an unequivocal signature of in-medium modifications by means of hadronic probes!