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Thomas Chen and **Natasa Pavlovic*** (natasa@math.utexas.edu), Department of Mathematics, University of Texas at Austin, 1 University Station, C1200, Austin, TX 78712. *On the Cauchy problem for focusing and defocusing Gross-Pitaevskii hierarchies.*

We consider the dynamical Gross-Pitaevskii (GP) hierarchy on \mathbb{R}^d , $d \geq 1$, for cubic, quintic, focusing and defocusing interactions. For both the focusing and defocusing case, and any $d \geq 1$, we prove local wellposedness of the Cauchy problem in weighted Sobolev spaces \mathcal{H}_ξ^α of sequences of marginal density matrices, for

$$\alpha \begin{cases} > \frac{1}{2} & \text{if } d = 1 \\ > \frac{d}{2} - \frac{1}{2(p-1)} & \text{if } d \geq 2 \text{ and } (d, p) \neq (3, 2) \\ \geq 1 & \text{if } (d, p) = (3, 2), \end{cases}$$

where $p = 2$ for the cubic, and $p = 4$ for the quintic GP hierarchy; the parameter $\xi > 0$ is arbitrary and determines the energy scale of the problem. This result includes the proof of an a priori spacetime bound conjectured by Klainerman and Machedon for the cubic GP hierarchy in $d = 3$.

Also, in the defocusing case, we prove global wellposedness in \mathcal{H}_ξ^1 of the cubic GP hierarchy for $1 \leq d \leq 3$, and of the quintic GP hierarchy for $1 \leq d \leq 2$. For the focusing GP hierarchies, we prove lower bounds on the blowup rate. All of these results hold without the assumption of factorized initial conditions. (Received January 24, 2009)