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Contribution to the study of neon-nitrogen mixtures at low temperatures

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Theoretical studies show that neon can influence the nitrogen phase diagram, lowering its triple-point temperature. The use of a neon-nitrogen mixture that could remain liquid at temperatures below the nitrogen triple-point (63.15 K) could solve some problems in the cryogenics field, namely to obtain a stable cryogenic fluid in the temperature range from 44 to 54 K, where no pure cryogenics liquids exist at all.

This work consists of a contribution to the study of mixtures of neon and nitrogen at various compositions at low temperatures, in order to assess how far beyond 63.15 K can the temperature at which nitrogen solidifies be lowered. For this purpose, a thermosyphon-like pressure vessel was built, able to withstand pressures up to 25 bars and in which some experiments were performed.

Indications that there may be a process of neon dilution in solid and liquid nitrogen are shown, as well as evidence of changes in the nitrogen phase diagram due to the introduction of neon, in comparison to a model that supposes no interaction between the two substances. Evidences of a change in the nitrogen triple-point temperature from 63.15 to 62.5 K are presented and discussed.

Primary author: BORGES DE SOUSA, Patrícia (LIBPhys, Physics Department, Faculty of Sciences and Technology, Universidade Nova de Lisboa)

Co-author: BONFAIT, Grégoire (LIBPhys, Physics Department, Faculty of Sciences and Technology, Universidade Nova de Lisboa)

Presenter: BORGES DE SOUSA, Patrícia (LIBPhys, Physics Department, Faculty of Sciences and Technology, Universidade Nova de Lisboa)

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