Mainz; "A Path Towards Room Temperature Superconductivity"

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***Abstract*—Room-temperature superconductivity is one of the most challenging and long-standing problems in condensed-matter physics. I will discuss the significant progress reached in the field and focus on three main subjects: metallic hydrogen, super hydrides, and the perspectives to find high-Tc superconductors at moderate pressures.**

In 2014, superconductivity at 203 K was discovered in H3S at high pressure, breaking archaic paradigms on conventional superconductivity [1]. Last year, with the advancement of the field, Tc of 250 K we had been reached in a super hydride LaH10 [2-3]. The mechanism governing these exceptional superconductors is the conventional electron-phonon coupling [5]. Theoretically, predictions point out other compositions that could superconduct at temperatures as high as 470 K [6]. These record-breaking superconductors are the result of chasing of a 50 years old prediction of high-temperature superconductivity in hydrogen [7-8]. In this respect, we will present the most recent efforts on seeking for the superconducting phase of hydrogen [9]. The progress towards room temperature superconductivity is likely to be related to hydrides under pressure [5]. I will outline perspectives for high-temperature conventional superconductivity at moderate and ambient pressure which is expected from arrangements of atoms of light-elements.

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