



Online Conference on Gravitational Physics and Astronomy

4-9 December 2022



<https://indico.cern.ch/e/GPA2022>



https://www.mdpi.com/journal/physics/special_issues/SPGPCC



Contribution ID: 42 Contribution code: **GPA22-13**

Type: **not specified**

Real Time Ultrasoft Scalars Self Energy at Next to-leading order in Hot Scalar QED

Thursday 8 December 2022 11:00 (30 minutes)

In a series of works, we have used the imaginary time formalism to study the infrared behavior of the gluon and quark damping rates [1, 2, 3, 4, 5, 6, 7]. The results have indicated that there are difficulties in the infrared sector. A similar observation has been done in the context of scalar electrodynamics [8]. To look further into the infrared behavior, we propose to calculate the next-to-leading order dispersion relations for slow-moving Scalars at high temperature scalar quantum electrodynamics (Scalar QED), using the real time formalism (RTF) in physical representation. We derive the analytic expressions of hard thermal loop (HTL) contributions to propagators and vertices to determine the expressions of the effective propagators and vertices in RTF that contribute to the complete next-to leading order contribution of retarded scalars self-energy. The real part and the opposite of the imaginary part of the retarded scalars self-energy are related to the next-to-leading order contributions of energy and damping rate respectively.

- [1]. A. Abada, O. Azi and K. Benchallal, Phys. Lett.B425, 158-164 (1998).
- [2]. A. Abada, O. Azi, Phys. Lett.B463, 117-125 (1999).
- [3]. A. Abada, K. Bouakaz and O. Azi, Phys. Scr. 74, 77-103 (2006).
- [4]. A. Abada, K. Bouakaz and N. Daira-Aifa, Eur. Phys. J.C18, 765-777 (2001).
- [5]. A. Abada, N. Daira Aifa and K. Bouakaz, Int.J.Mod.Phys.A21, 5317-5332 (2006).
- [6]. K. Bouakaz, A. Abada, AIP Conf.Proc.1006:150-153, (2008).
- [7]. A. Abada, K. Bouakaz and D. Deghiche, Mod.Phys.Lett.A22, 903-914 (2007).
- [8]. A. Abada and K. Bouakaz, JHEP01, 161-187 (2006).

Primary author: Dr BOUAKAZ, Karima (ENS-KOUBA)

Presenter: Dr BOUAKAZ, Karima (ENS-KOUBA)