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Confinement and de-confinement aspects of fermion in lower dimensional field theoretical model and its symmetry, e.g. BRST and field dependent BRST

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Lower dimensional field theoretical models, e.g. Schwinger model, Chiral Schwinger model, Non-Confining Schwinger model, Thirring-Wess model and its Chiral generation known as Chiral Thirring-Wess model are of great interest because the models can explain the mass generation via dynamical symmetry breaking. It was known that the Schwinger can explain the confinement of fermions. However, in the Non-confining Schwinger model fermions are found to get liberated. The usual Chiral Schwinger model also fails to describe the confinement aspect of fermions. But Chiral Schwinger model with a particular counter term can explain the confinement aspect of fermions too. All these models are exactly solvable and exact bosonization of these models are possible. The Schwinger model is the eldest of all. Only Schwinger is gauge invariant at the quantum mechanical level. Other models are not so. But Gauge invariant, as well as BRST invariant reformulation, of all these models is found possible. Extension of phase space is needed to make these models gauge symmetric. Since extension of phase space is needed to make these models invariant under gauge and BRST transformations. It is important to ensure that physical contents must remain unchanged in presence of the extension of phase space required to make these models Gauge as well as BRST symmetric. There are different approaches to show it. Field dependent BRST (FFBRST) transformation is a current development in this direction. These systematic developments related to these lower dimensional models will be the subject of my presentatio

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