It is wonderful to be with all of you, even though via zoom and celebrate together our friend Gabriele 80th birthday.

Gabriele is not just a great physicist with many unique and novel achievements which opened new fields of research, he is also a dear and generous friend and a great human being. I'm among the priviledged ones who have enjoyed all these facets of Gabriele.

as we know Gabriele has a particularly deep and wide knowledge and has contributed significantly to so many fields. I would like to mention one such field that I was working on with Gabriele: it is on non-perturbative aspects of supersymmetric theories and in particular the effective holomorphic superpotential of N=1 SYM and N=1 SQCD for $N_f<N_c$. (the last one in collaboration with Tomaz Taylor). We were the first to write down those exact superpotential based on the symmetries, including R-symmetries and, following the reasoning in the works of Gabriele on the effective chiral theory of QCD, incorporating also the exact WI associated with the anomalous U(1) current. The works were carried out in 1982 when I stayed at CERN. So it is now the 40th anniversary of these works. We had, at the time, a series of talks on SUSY by Sonious and with the background of Gabrielein non-perturbative aspects of QCD and its effective chiral Lagrangian, it was only natural to look at N=1 SYM and SQCD. The works have ~~achieved~~ attracted much attention with, so far, about 800 citations to the one on SYM and about 400 citations to the one on SQCD.

In both works the important role of the gluino condensate played a major role in understanding and writing down the superpotential and examining the vacuum structure. In both cases SUSY is not broken. In the SYM case the left over Z_{2N_c} symmetry of the broken chiral anomalous current(analogue of the Z_{2N_f} in QCD) is further broken by the gluino condensate down to Z_2 and is responsible for the N_c fold vacuum degeneracy with domain walls separating them. To construct the superpotential which exhibits these properties we used the "glueball"

superfield S known also as the chiral part of the Lagrangian superfield (and appear in the superfield anomaly equation). The domain walls behave somewhat as D-brans with tension that can be computed and have some degrees of freedom living on them. The Nc-fold vacuum degeneracy with a mass gap exhibited by the superpotential agrees with the Witten index being Nc. It captures not just the vacuum structure but also the chiral ring structure S^Nc=1.

The SQCD superpotential is written in terms of S and the matrix of superfields T_i^j (which are the meson superfields Q_i\tildaQ^j bilinear in the quark superfields). This superpotential exhibits the runaway nature of the vacuum. The classical moduli space degeneracy is lifted with the vacuum running away. Introducing a mass term associated with the quark multiplet, one can stabilize the vacuum and discuss its structure. We checked that the superpotential correctly captures the decoupling associated with taking one mass to be large reducing Nf to Nf-1 and continuing the whole way decoupling all matter degrees of freedom until our exact superpotential for SYM is obtained. Doing it we also established the correct threshold behaviour of the RG invariant \lamda scale as we decouple each flavor by giving it a large mass.

We have also witnessed the singularity in the superpotential expression for Nf=Nc. Unfortunately we did not ask what will happen for Nf=>Nc (up to 3Nc) which was elucidated in the most beautiful work of Nati Seiberg who discovered the reach physics there, including the conformal window and the N=1 new dualities. For N_f<Nc our superpotential coincides with the one of Seiberg as can be seen by integrating out the massive superfield S. Alternatively, one can start from Seiberg and perform the integration in via a Legender transform with respect to the superfield S whose source is the RG invariant scale \lamda^(3Nc-Nf).

I would like to mention that the N=1 SYM superpotential which is refered to in the literature as the Veneziano-Yankielowicz superpotential, has been derived later also via some matrix model approach and also via some stringy approach. It has found many applications as is witnessed by the

many citations which continue to come up in a strong way until today.

so far for Physics and Now to some personal words:

Gabriele, it's your 80th birthday. You are still young in spirit and mind. Let me remind you that, as it is written in the bible, Moses was 80 years old when he was ordered by god to stand up for the first time before Pharaoh demanding "let my people go". His whole important work was still ahead !

So let me wish you a very happy birthday with a lot of happiness and success and most importantly in good health.

I'll finish by quoting the children writer Dr. Suess:

You have brain in your head,
You have feet in your shoes.
You can stir your direction,
Anyway which you choose.

You are on your own,
And you know what you know.
And you are the guy,
Who'll decide where to go.

So relax and smile,
Life is just to begin.
You're in pretty good shape,
For the shape you are in.

Today is Your day, it is Truer than True,
There is no one alive who is Youer than You.
You are what you are, what a great thing to be,
If I may say it myself, Happy Birthday from Me.

Happy birthday Gabriele!

We love you a lot