

Dedicated to the memory of

Guido Altarelli

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Guido Altarelli and TU

-personal recollections-

- I first met Guido at Yukawa Inst. Kyoto on the occasion of Tokyo Conference 1978
- During his stay in Kyoto we discussed on the QCD parton picture since both of us studied the evolution eq. of the parton dist.
- I studied evolution equation for fixed point theory which was quoted in Altarelli-Parisi paper as “T. Hematsu, Kyoto preprint”
- I applied AP evolution eq. to fragmentation functions in the case of QCD

Altarelli-Parisi evolution equation

ASYMPTOTIC FREEDOM IN PARTON LANGUAGE

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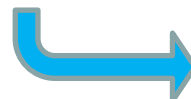
Received 12 April 1977

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- [9] G. Parisi, Proc. 11th Rencontre de Moriond on weak interactions and neutrino physics, 1976, ed. J. Tran Thanh Van.
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R.L. Heimann, Nucl. Phys. B64 (1973) 429.
- [11] G. Parisi, Phys. Letters 43B (1973) 207; 50B (1974) 367.
- [12] J. Kogut and L. Susskind, Phys. Rev. D9 (1974) 697, 3391;
T. Hematsu, Kyoto preprint, RIFP-251 (1976).



PTP 56 (1976) 1599

Evolution eq. for fixed-point theory

Progress of Theoretical Physics, Vol. 56, No. 5, November 1976

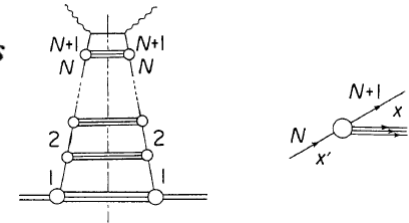
RIFP-251(1976)
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Parton Model with Anomalous Dimension

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the recursion relation

$$F_2(x, N+1) = \int_x^1 \frac{dx'}{x'} f\left(\frac{x}{x'}\right) F_2(x', N).$$

The differential form of the recursion formula can be derived from

$$q^2 \frac{\partial}{\partial q^2} F_2(x, q^2) = \int_x^1 \frac{dx'}{x'} H\left(\frac{x}{x'}\right) F_2(x', q^2),$$

$$-\gamma_n = \int_0^1 \eta^n H(\eta) d\eta.$$

Q²-dependent fragmentation function

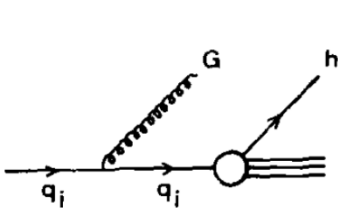
Altarelli-Parisi type Q²-evolution equation for the fragmentation functions

T.U., Phys.Lett. B79 (1978) 97; see also RIFP-292 and 309 (1977)

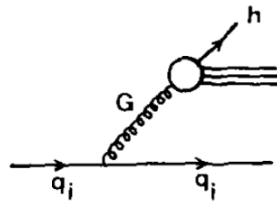
$$\frac{\partial}{\partial t} D_{q_i}^h(z, t) = \alpha(t) \int_z^1 \frac{dz'}{z'} [P_{qq}(z/z') D_{q_i}^h(z', t) + P_{Gq}(z/z') D_G^h(z', t)] \quad (i = 1, \dots, 2m),$$

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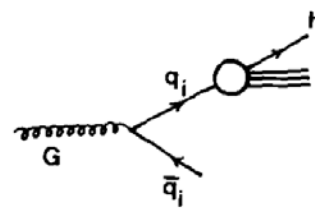
$$\frac{\partial}{\partial t} D_G^h(z, t) = \alpha(t) \int_z^1 \frac{dz'}{z'} [P_{qG}(z/z') \sum_{i=1}^{2m} D_{q_i}^h(z', t) + P_{GG}(z/z') D_G^h(z', t)],$$



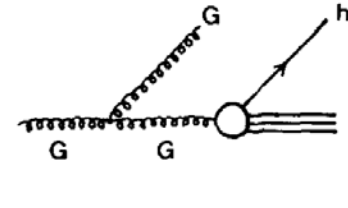
(a)



(b)



(c)



(d)

Guido Altarelli and TU (cont.)

- While I was staying at CERN in Fall 1980 he invited me to Rome University. I talked about QCD 1st order effect on Bj sum rule of polarized structure function g_1 which was studied by Kyoto Univ. Group, Kodaira et al.
- From 1980 to 1981 I studied virtual photon structure functions based on AP equation.
- He visited Japan from time to time. In 2002 he visited Kyoto with Mrs. Altarelli, Monica.
- We invited him to 2010 HESI at YITP. The photo on next page was taken at Mt. Hiei.



Guido Altarelli in Kyoto (Mt.Hiei)

Photo in Aug 2010

His great contributions to high-energy physics will remain forever. We will greatly miss him and I'd like to pray for the repose of Guido's soul.