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Сибирское отделение
ИНСТИТУТ ЯДЕРНОЙ ФИЗИКИ
Новосибирск 90, СССР

USSR ACADEMY OF SCIENCES
Siberian Division
INSTITUTE OF NUCLEAR PHYSICS
Novosibirsk 90, USSR

Dear Joe,

Yes, we are orphaned now, our leader, teacher and friend Andrey Mikhaylovich Budker has died on July 4 of a sudden heart attack... He has been seriously ill since his first severe heart attack many years ago. Yet, he could not work half-strength but was very skilful to hide his decease...

Thank you, Joe, for many many interesting materials I am permanently receiving from you as well as for nice pictures, both official and private. I believe it is a brilliant idea about your ALISE (abstract listing service). On our part, I and Felix, will try to cover Russian literature on the subject.

I think it is quite feasible for you to visit Akademgorodok on the back trip from Japan. I discussed the matter with some officials and they told me that there are two possibilities. First, you may try to organize this visit vie our Agreement for

collaboration which the latter is to be performed, in turn, within the framework of the General Agreement on Scientists Exchange between our countries. In this case you need just to apply to your Academy, and all expenses within the USSR will be paid by our Academy. Secondly, our Institute may invite you but unfortunately we can pay your expenses only within Novosibirsk, and the visit must not exceed one week. In this latter case you need to apply for the transit visa to the intourist with the letter of official invitation I shall send you later on. But I need to know if you will be alone or with somebody of your family. Anyway, it would be very nice if you could come. We have a lot to discuss. In particular, we have got here from numerical experiments a strong evidence that there is no local instability in a quantum system, at

least, in a particular system - the pendulum - we are studying. Partly this was discovered with Giulio during his visit here from a stable behavior of the average momentum - you must know this part. Recently Felix has computed the phase behavior - I mean Fourier amplitude phases φ_n ($\psi = |a_n| e^{i(n\theta + \varphi_n)}$) - for two close quantum trajectories $\delta\psi$ to observe a perfect stability of the quantity $\sum_n (\delta\varphi_n)^2$ in spite of the fact that there was a 'diffusion' in energy close to expected one. We have now a growing suspicion that such a 'diffusion' is a mystification and the true long-term behavior would be an almost periodic one.

Another interesting phenomena observed by a student I have attracted to this problem are resonances at $T = 4\pi m/n$ (m, n - integers). The main resonances $n = 1$ are trivial. Giulio discovered a strange, very precise, recurrence ('antiresonance') for

$n=2$. For $n=3; 4; 8; 32$ we observed the behavior similar to that for $n=1$. The width of a resonance is very narrow, for instance, $|\Delta T| \leq 10^{-3}$ for $n=4$. Off this narrow resonance band the 'diffusion' seems to go as expected.

Besides many particular questions on the quantum dynamics a general problem arises about transition from quantum to classical limit (?) Quantum numbers in all cases mentioned above are quite big (~ 100).

Hoping to see you first in Novosibirsk,

best wishes

Boris

8/VIII 77г.

P.S. We have got a small garden not far from Akademgorodok. Olya believes that it is the best relaxation to work in garden.