

health.

With best regards to Lady Krishnan and best wishes to dear
Bapu, Ambedkar and others,

Yours very sincerely,

R. M. Karandikar

Sir X. S. Krishnan, D.Sc., F.R.S.,
Director, National Physical Laboratory,
Hill Side Road, New Delhi, India.



To,

Sir, K. S. Krishnan, D.Sc., F.R.S.
Director, National Physical Laboratory,
Hill Side Road,
New Delhi. INDIA.

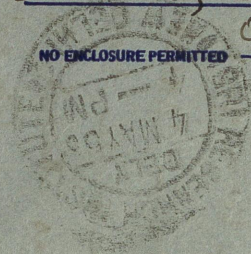
NEW DELHI. INDIA.

FIRST FOLD HERE — PLIEZ D'ABORD ICI

SECOND FOLD HERE — PLIEZ ENSUITE ICI

SENDER'S NAME AND ADDRESS — NOM ET ADRESSE DE L'ENVOYEUR

From: Dr. R. V. Karandikar,
Division of Physics,
National Research Council,
Sussex St., Ottawa 2
Ont., CANADA.



NO ENCLOSURE PERMITTED — NE RIEN INSÉRER

TO OPEN CUT HERE — POUR OUVRIR, COUPEZ ICI

Division of Physics,
National Research Council,
Sussex st.
Ottawa 2, Ont. CANADA.

28th April, 1953.

Respected Professor,

I am sorry I have not written to you since I left India. My term of Fellowship in this Council expires in November 1953. My stay in CANADA has been pleasant and fruitful. In the opinion of the people here, I have been able to do some good work. I was attached to the Photometry & Colorimetry section and had facilities, to a certain extent, from the Spectroscopy section (under Dr. Herzberg) also. I have worked on some topics in the photometry & colorimetry of the twilight sky, and presently I am trying to study the intensity variations of the N_2^+ bands during twilight in order to get the vertical distribution of N_2^+ in the upper atmosphere. I have also in mind to do some ~~at~~ high resolution interferometric studies of ~~the~~ some of the twilight and night sky emission lines in order to get the temperatures of the emitting layers from the Doppler broadening of the lines.

Recently some I.C.I. Fellowships tenable in the Universities of London, Cambridge and Oxford were advertised and I have applied for them. I have given your name as one of the referees. If the application is referred to you, may I request you to kindly write a few lines about me? Under the nature of the proposed research work, I have given some topics in the study of the twilight and night airglow, i) photochemistry of ozone and sodium with applications to the ozone layer and the sodium in the upper atmosphere, and iii) ultraviolet & infrared spectroscopy of some solar features, like sunspots, prominences, etc. (work to be done at the Solar Physics Observatory at Cambridge).

I hope Lady Krishnan and yourself are keeping good

10 type
2 copies
APP 102

Physique de l'Atmosphère,
1, Quai Branly,
PARIS (7^e). FRANCE.
30 March, 1955.

Respected Professor,

I was glad to receive your letter of 8/2/55, and I have sent in a formal application to the Secretary, C.S.I.R., New Delhi, with a copy to Sir K.S. Krishnan.

Recently I have come across certain data regarding the latest E.M.I. photomultiplier tubes now in regular production, and if you have not already got their details, the following information regarding two of them might be interesting. The types E.M.I. 6685 (with S-4 response) and E.M.I. 6256 (in a quartz envelope and with S-5 response), with end-on photocathodes of small area, have great superiority over the corresponding RCA 1P21 and 1P28 tubes and would be best suited for any future work involving extremely low light levels. The E.M.I. 6685 tube is now being incorporated in the 4-colour night sky photo-meter of Dr. Roach, and E.M.I. 6256 would be excellent for work on ozone. Some of the important characteristics of the above tubes are given below for comparison.

	Response: S-5 (U.V.)		Response S-4	
	RCA 1P28	E.M.I. 6256 (grade B)	RCA 1P21	E.M.I. 6685 (grade B)
i) Stages	9	13	9	14
ii) Multiplication (at 160V/stage for the E.M.I. and 100V/stage for the R.C.A. Tubes)	$10^5 - 10^6$	10^8	2×10^6	5×10^8
iii) Photocathode dark current (amp)	$10^{-12} - 10^{-13}$	$< 10^{-15}$	10^{-13}	$< 10^{-15}$
iv) Overall collector sensitivity amp./lumen	2-20	2000 ✓	80	10,000
v) Price	£ 8 (?)	£ 50 ✓	?	£ 40
vi) Delivery time	?	1-2 months		3-6 months

Selected E.M.I. tubes (grade A) have still better characteristics and cost a

little more. In view of the very low dark current and high sensitivity of the type 6256, it might be worth^{while} replacing the 1P28 tube in the Dobson ozone spectrophotometer by this, and, with some improvement of the amplifier (the one in the new instrument is not particularly good, and gains better than 10^4 or 10^5 can now-a-days be obtained with excellent stability), perhaps observations on bright stars might be possible and the study of the variation of atmospheric ozone throughout the day and night could be carried out. At any rate, the observations on moonlight should be as simple as the sun observations, without the need of focussing an image on the slit. It might be worth trying this at Ahmedabad in the old instrument without waiting for others to do it. There is also a red sensitive tube (E.M.I. 6095), but it is not as sensitive as the above ones. If you like, I would send you more details and practical notes; the manufacturers send some data and could be obtained by writing to 'E.M.I. Research Laboratories Ltd., Blyth Road, Hayes, Middlesex, England'. We hope to get an E.M.I. 6685 (grade A) tube and a narrow band all-dielectric filter for the night sky work here.

All-dielectric interference filters with a pass-band as narrow as $15-20 \text{ \AA}$ are now available from the Baird Associates (Attention: Dr. Billings), Cambridge, Mass. These are rather very expensive; the cost of the usual size ($2'' \times 2''$) filter is around \$75-80, and that of a 6"-diameter filter is about \$750. Dr. Mauzing of the High Altitude Observatory, Sunspot, New Mexico, is using a 6" filter of this type in conjunction with a single-element quartz birefringent filter and polaroids, thus getting a narrow region of less than 6 \AA ; with a chopping technique, he hopes to isolate the green line in the night airglow in full moonlight!

Dr. St. Amand from Dr. Roach's group is at present at the 'Institut d'Astrophysique' on a Fulbright Fellowship, and is an interesting person; he is the one mainly responsible for the technical development of their project. They have now completed a revised version of the night sky photometer with a 6"-optics and an E.M.I. 6685 tube; with the great increase in the light flux and sensitivity and other improvements in the electric and electronic installations, the whole sky will be scanned in 3-4 minutes (the old instrument took 32 minutes). The cost is about \$12,000; but a simpler model costs about \$2,000. I hope India will have at least one of the cheaper models for the Geophysical year. A paper by St. Amand describing the new instrumentation for night airglow work is under publication, and is quite interesting.

We had here Prof. C. G. Rosby and Dr. V. H. Regener sometime back. It is too sad that only a fortnight after the latter's visit, we heard about the sudden demise of his father, Prof. E. Regener.

As regards my work here, everything is still on papers and order-forms and some bits might perhaps be available by the time I leave France! Things are too slow in this country and people are easy-going; they don't seem to realize that man's life is so short and one has to finish lots of things in this short span. It is a pity that I did not finish this piece of work in Canada.

Apart ~~from~~ ^{from} this, other domestic difficulties and worries are ~~there~~ ^{there}. As you know, I have left Sheshikala and Anant in Poona, and our family situation is such that it is very difficult and inconvenient for them to live there ^{on their own} for a long time with the present arrangements; I have either to get them ^{here} very soon or else I may have to return myself to India before long. Since no passage money is paid by the French Government either for me or for my family, I am trying to avoid the unnecessary heavy expenditure and hardships involved in their journey just for a subsequent short stay here. If things about the scientific setup in India have now come to a normal during the past three months or so, and if I stand some chance in any of the present or future schemes during the next few months, we would rather prefer to put up with the difficulties a little longer in the hope of future conveniences and stability. If, however, the chances are not very favourable or are too remote, I may have to take the risk of incurring the above expenditure and settling down somewhere for the next few years.

Though working at various institutions adds to one's general outlook and experience to a certain extent, many times it involves unnecessary duplication of apparatus and consequent time-killing, and I feel that any serious work on ~~any~~ a long-term project, which would really contribute substantially to one's scientific career, will not be possible unless one settles down somewhere and has a little stability and peace of mind. I have to do something quickly before long under the present circumstances, and I thought it better at least to explain the situation to one ^{to} whom I look for greatest sympathy and advice, instead of ^{just} keeping quiet and waiting indefinitely.

I hope you are keeping good health and having a fairly comfortable ^{first} hot season in the new building ^{of which} of the laboratory [^] ^{a picture}

~~of which~~ I saw [^] sometime back in Nature.

I would be glad to have, ^{at your convenience,} reprints of your papers on i) ^{the work on} the vertical distribution of ozone at Mt. Abu, ii) ^{effect of} secondary scattering -- etc. iii) note in Nature on the diurnal variation of ozone, iv) any subsequent publication which I have not ~~not~~ seen, I would be glad if you could also spare a copy of your Presidential Address at Rome last September. The library facilities here are rather ~~very~~ unsatisfactory and many times I have to depend on the reprints I have collected so far.

With highest regards,

Yours very sincerely,

R. Karandikar

Prof. K. R. Ramanathan,

M.A., D.Sc., F.N.I.,

Director,

Physical Research Laboratory,

Navarangapura, Ahmedabad 9, INDIA.

Department of Applied Mathematics,
The Queen's University,
Belfast, Ireland.

5 September, 1955.

Respected Professor,

I have come to Belfast to attend a Conference on the Airglow and Aurorae. On my way, I met Prof. Ramanathan in Bristol and discussed with him, amongst other things, my present work concerning multilayer interferometry and its application to astrophysical and geophysical problems, in particular to the airglow and aurorae. He thinks that my proposed study of the Doppler widths of the atomic lines in the airglow under normal and disturbed geomagnetic conditions would be an interesting and very useful programme during the International Geophysical Year, and that I should plan my future work in India. It would be possible to find some equipment at Ahmedabad; but for obtaining the Fabry-Perot flats, which are a bit costly, and for facilities regarding the evaporation of the dielectric layers, N.P.L. would be the best place. Once the main optical parts are obtained and the vacuum equipment already available at Delhi is set up with some modifications for the evaporation of multiple layers, the above programme could be easily carried out during the period of the I. G. Y., and I believe that the same equipment could also be later used to tackle other problems within the usual scope of the programme at the N.P.L. Prof. Ramanathan has therefore suggested that I meet you

sometime during your stay in London from 17th to 20th September and explain the plan of the work and the needs which could possibly be met with by the N.P.L. If you could kindly write to me as soon as possible at the following London address ^{about} the date, time and place convenient to you, I would come and meet you. A date nearer to 17th would be more suitable for me, so that I ~~need not go~~ ^{may have to postpone my going} back to Paris only for 3-4 days.

Prof. Ramanathan is also dropping a line to you in this respect.

With best regards,

Yours very sincerely,

R.V. Karandikar

Sing K.S. Krishnan,
D.Sc., F.R.S.,
C/o Dr. S. Krishna
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London W.C. 2 England.

My London Address :-

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London W4. England.