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X-RAY OBSERVATIONS OF THE SEYFERT 1 GALAXY MCG 2-58-22

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ABSTRACT

Results of the detailed X-ray (0.1–10 keV) spectral analysis of the Seyfert 1 galaxy, MCG 2-58-22, are presented based on the *EXOSAT* observations on 1984 November 16–26. X-ray spectra of this source were obtained from the *EXOSAT* archives. Weak, soft flux (0.1–2 keV) variations were found on time scales of 2–3 days, and no variations of the hard flux were found during the *EXOSAT* observations. A power-law + absorption model fitted well to the combined LE + ME data sets but the hydrogen column density (N_H) values were smaller than the Galactic N_H value. A power-law + fixed absorption (fixed with the Galactic N_H value) model does not fit well with the data sets. Variable soft excesses have been detected in this source. A two power-law model provides good fits to the soft excesses. Variations of the LE count rate are correlated with the variations of the soft spectral index (obtained from the two power-law fit) and anticorrelated with the hardness ratio of this source. A highly significant (99.9%) emission line at 5.8 ± 0.7 keV with the measured equivalent width as 160 ± 110 eV has been detected in the X-ray spectra of MCG 2-58-22. The significance of these results are discussed.

Subject headings: galaxies: individual (MCG 2-58-22) — galaxies: Seyfert — radiation mechanisms: bremsstrahlung — X-rays: galaxies

1. INTRODUCTION

MCG 2-58-22 (Mrk 926) is a bright type 1 Seyfert galaxy located at a distance of 288 Mpc ($z = 0.048$, $H_0 = 50$ km s^{-1} Mpc^{-1}) which has a barely resolved central radio source. Optical spectra of this galaxy display extremely broad Balmer lines, and a weak broad [O III] wing (Vrtilek & Carleton 1985; van Groningen & de Bruyn 1989). The nucleus of this galaxy is surrounded by a very large ionized nebulosity, and it is one of the largest nebulosity detected around Seyfert 1's (Durret 1989). Results of *JHKL* photometry have displayed variations of sufficient amplitude (Glass 1989) in this galaxy which shows more polarization in the longer wavelength (0.63% in the *H* band) than in the shorter wavelength (0.35% in the *V* band) (Brindle et al. 1990).

X-ray spectra of MCG 2-58-22 obtained from *Einstein* SSS + MPC (Holt et al. 1989), *HEAO 1*, and *HEAO 2* (Mushotzky 1984) observations showed no evidence of soft excess in it, and the values of the spectral index were lower than the canonical value (Mushotzky 1984; Turner & Pounds 1989) ($\alpha = 0.7$). This source was observed with *EXOSAT* on six epochs during 1984 November 16–26. Of six spectra, only one spectrum has been published (Pounds & Turner 1988; Turner & Pounds 1989) using a simple power-law model and they have confirmed the lack of evidence of a soft excess. However, detailed spectral analysis of all the spectra obtained for this AGN may provide new results.

In this paper we present the results of the six low- and medium-energy spectra of MCG 2-58-22 which were observed with *EXOSAT*. The spectrum of this galaxy shows the evidence of an iron line at 6.4 keV. In § 2 we present the observational details, and spectral analysis and results are presented in § 3. Finally, we discuss the implications of the results in § 4.

2. OBSERVATIONS

The X-ray observations of MCG 2-58-22 were performed with *EXOSAT* at six epochs between 1984 November 16 and 26, using both the LE and ME detectors. The details of the *EXOSAT* instrumentation can be found in White & Peacock (1988). LE and ME detectors have been described by de Korte et al. (1981) and Turner, Smith, & Zimmerman (1981), respectively. The particulars of the LE and ME observations are given in Table 1. The LE observations were carried out with the Lexan 3000 (LX3), aluminium/Parylene (Al/P) and boron (B) filters. Details of the filter efficiencies are given in White & Peacock (1988). The ME data were obtained from the eight argon-filled proportional counters. The eight counters (each one will be referred to as a "detector") are divided into two parallel rows of four detectors ("halves"), viz., the detectors numbered 1, 2, 3, and 4 are collectively known as half 1 and the detectors number 5, 6, 7, and 8 are together known as half 2. These two halves can be either aligned to the pointing axis or offset by up to 2° to monitor the background. The "swap" procedure was adopted in all the six observations for background subtraction (Smith 1984; White & Peacock 1988; Yaqoob, Warwick, & Pounds 1989). The above-mentioned background-subtraction analysis of the six ME spectra of MCG 2-58-22 which are presented in this paper, were carried out at the *EXOSAT Observatory*.

Background-subtracted LE count rates with errors were obtained from the *EXOSAT* data base and the corresponding LE pulse-height (PHA) spectra were obtained using the XANADU (X-ray Analysis and Data Utilization) software package.

Table 1 gives the average LE and ME count rates in the 0.1–2 keV and 2–10 keV ranges, respectively, for each of the observations and the corresponding light curves are plotted in Figure 1. Weak variations of the count rates were observed on time scales of 2–3 days which can be seen from Table 1 and Figure 1.

3. ANALYSIS AND RESULTS

Analysis of the combined LE and ME spectra were performed using the XSPEC (X-ray Spectral Fitting) software

TABLE 1

LOG OF OBSERVATION OF THE LE AND ME SPECTRA, COUNT RATES, AND HARDNESS RATIO OF MCG 2-58-22

START TIME[a] (1984)	END TIME[a] (1984)	LE COUNT RATE (10^{-4} cm^{-2} s^{-1}) LX3	Al/P	B	ME COUNT RATE[b] (10^{-3} cm^{-2} s^{-1})	HARDNESS RATIO
321, 06:26	321, 12:32	8.78 ± 0.83	4.23 ± 0.50	...	2.75 ± 0.046	3.13 ± 0.30
322, 23:39	323, 02:51	6.98 ± 0.56	4.42 ± 0.37	...	2.65 ± 0.062	3.79 ± 0.30
325, 19:30	325, 22:46	7.62 ± 0.61	4.20 ± 0.39	...	2.90 ± 0.068	3.80 ± 0.30
327, 03:08	327, 06:17	8.80 ± 0.62	4.87 ± 0.40	...	2.95 ± 0.064	3.35 ± 0.24
329, 10:43	329, 14:17	7.41 ± 0.57	5.10 ± 0.38	...	2.95 ± 0.059	3.99 ± 0.31
331, 15:08	331, 22:34	8.28 ± 0.57	4.59 ± 0.41	1.23 ± 0.14	2.63 ± 0.046	3.17 ± 0.21

[a] Format: day, hour:minutes.

[b] The count rates are for PHA channels 6–35 corresponding to the energy range 2–10 keV with the best signal-to-noise ratio.

package. Six spectra of MCG 2-58-22 obtained over 10 days in 1984 November were analyzed separately to avoid systematic effects due to background variations and possible source variations. First, we used a simple power-law model along with absorption in the line of sight to the source to fit the data. The absorption cross sections given by Morrison & McCammon (1983) were used. The best-fit parameters of the power-law model (model 1) are presented in Table 2 along with the 90% confidence error bars, which were computed for each parameter by keeping all other parameters free, following the procedure described by Lampton, Margon, & Bowyer (1976) ($\chi^2_{min} + 4.61$ for two interesting parameters). We find from the χ^2 statistics (presented in Table 2) that this simple power-law model provides acceptable fits to all the data sets except the spectrum of 1984/327, but the column density values of the equivalent hydrogen (N_H) along the line of sight to MCG 2-58-22 are smaller than the Galactic N_H value (0.34×10^{21} cm^{-2}; Stark et al. 1992). In the next model (model 2) we fix the value of N_H with the Galactic value and the best fit parameters with 90% confidence errors are presented in Table 3. From this table it is evident that this model is unacceptable, because of the large values ($\gg 1.0$) of the reduced χ^2 for model 2. In Figure 2 we show the observed LE and ME spectra of MCG 2-58-22 with the best-fit model (power-law + fixed absorption) convolved through the detector response and the residuals between the model and the spectrum are shown in the lower panel of this figure. Residuals of this figure clearly show that soft emissions (below 2 keV) are present in this galaxy. Figures 3*a* and 3*b* display the residuals between the six spectra and the model, which clearly show that the soft emissions (or excesses) are variable.

From the fit parameters of model 1 (see Table 2) we have already seen that the value of N_H is less than the Galactic value. "Negative N_H" values imply a source spectrum with more emission than the power-law prediction at low energies, i.e., a "soft excess" (Wilkes & Elvis 1987; Kruper, Urry, & Canizares 1990). Also the contour plots of Wilkes & Elvis (1987) show that forcing a column density in the presence of a

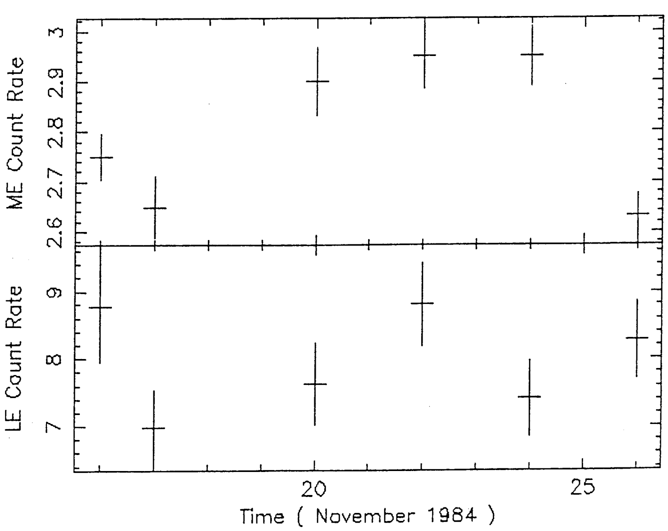

FIG. 1.—Plot of the LE and ME count rates vs. date of observations

TABLE 2

SPECTRAL FITS TO THE SPECTRA OF MCG 2-58-22: MODEL 1: POWER-LAW + ABSORPTION

Date (1984)	Γ[a]	N[b]	N_H[c]	χ^2_r/d.o.f.
321..........	$1.52^{+0.07}_{-0.06}$	$6.00^{+0.56}_{-0.52}$	$0.80^{+0.39}_{-0.28}$	0.82/29
322..........	$1.58^{+0.08}_{-0.09}$	$6.32^{+0.75}_{-0.68}$	$1.35^{+0.60}_{-0.45}$	1.11/29
325..........	$1.52^{+0.09}_{-0.08}$	$6.25^{+0.78}_{-0.70}$	$1.08^{+0.55}_{-0.40}$	0.83/29
327..........	1.19	3.98	2.81	2.20/29
329..........	$1.63^{+0.08}_{-0.08}$	$7.35^{+0.78}_{-0.75}$	$1.64^{+0.56}_{-0.48}$	1.31/29
331..........	$1.62^{+0.07}_{-0.07}$	$6.58^{+0.86}_{-0.61}$	$1.24^{+0.47}_{-0.37}$	0.88/30

[a] Photon index.

[b] Normalization in 10^{-3} photons cm^{-2} s^{-1} keV^{-1} at 1 keV.

[c] Column density in 10^{20} cm^{-2}.

TABLE 3

SPECTRAL FITS TO THE SPECTRA OF MCG 2-58-22: MODEL 2: POWER-LAW + FIXED ABSORPTION[a]

Date (1984)	Γ[b]	N[c]	χ^2_r/d.o.f.
321.....................	$1.66^{+0.06}_{-0.07}$	$7.22^{+0.61}_{-0.59}$	1.99/30
322.....................	$1.76^{+0.06}_{-0.06}$	$8.05^{+0.56}_{-0.57}$	1.67/30
325.....................	$1.74^{+0.05}_{-0.06}$	$8.33^{+0.60}_{-0.63}$	1.57/30
327.....................	$1.81^{+0.05}_{-0.06}$	$9.46^{+0.60}_{-0.63}$	1.95/30
329.....................	$1.78^{+0.05}_{-0.05}$	$8.97^{+0.55}_{-0.57}$	1.76/30
331.....................	$1.81^{+0.05}_{-0.05}$	$8.47^{+0.51}_{-0.51}$	1.78/31

[a] Fixed at the Galactic N_H value (3.4×10^{20} cm^{-2}).

[b] Photon index.

[c] Normalization in 10^{-3} photons cm^{-2} s^{-1} keV^{-1} at 1 keV.

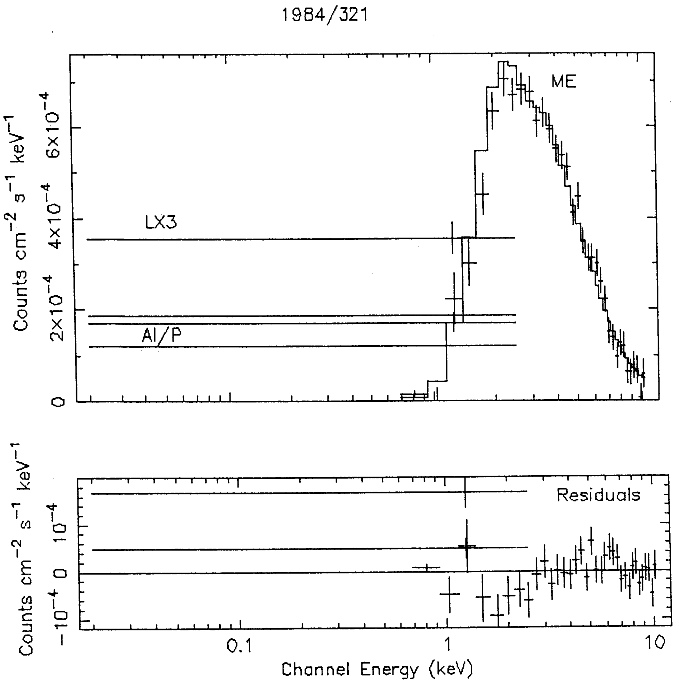

FIG. 2.—Observed spectrum of MCG 2-58-22 fitted with a simple power-law and fixed absorption model. Lower panel of the figure shows the residuals between the spectrum and the model.

soft excess always steepens the spectral slope. This type of spectral steepening can also be seen in MCG 2-58-22, from the comparison of the Γ values between model 1 and model 2 (see Tables 2 and 3). These results suggest that a softer spectral component must be introduced to fit to the LE+ME spectra. We have used thermal bremsstrahlung and two power-law models to fit separately to the spectra of MCG 2-58-22. A thermal bremsstrahlung model is not acceptable because of the large χ_r^2 values (>2.0). However, runs made with the two power-law model (model 3) provide acceptable fits to the data. Best-fit parameters of this model are presented in Table 4. From the *F*-test statistics, computed between models 2 and 3, it is evident that the inclusion of the soft power-law component is highly significant (see Fig. 4). Also, the derived soft (0.1–2 keV) and hard (2–10 keV) fluxes and luminosities are presented in Table 4 and plotted in Figure 5. Table 4 and Figures 1 and 5 show that MCG 2-58-22 displayed weak variations in both the LE and ME bands during *EXOSAT* observations. However, the variations of the LE and ME count rates which are plotted in Figure 6, are uncorrelated (the coefficient of the linear regression fit between the LE and ME count rates is 0.11 for six observations which indicate that the probability of the fit being random is >50%). Fit parameters of Model 3 (two power-law model) show that the soft spectral index (Γ_1) and the hardness ratio (ME/LE) of the source are correlated (correlation coefficient is 0.65 for six observations; Fig. 7*a*) and anticorrelated (correlation coefficient is −0.86 for 6 observations; Fig. 7*b*) with the LE count rate, respectively. However, the hard spectral index (Γ_2) did not vary, and the ME count rate and the hardness ratio of the source are uncorrelated (correlation coefficient is 0.40). Mean value of Γ_2, obtained from *EXOSAT*

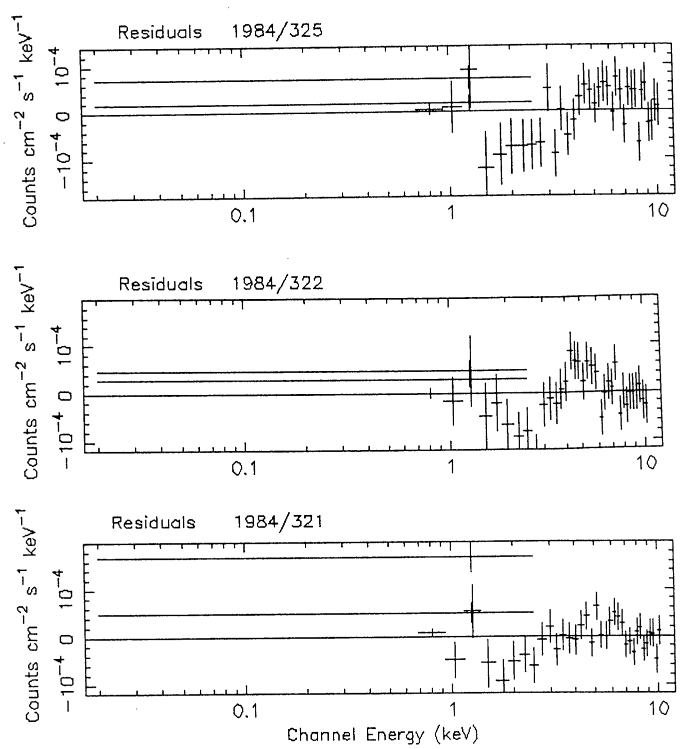

FIG. 3*a*

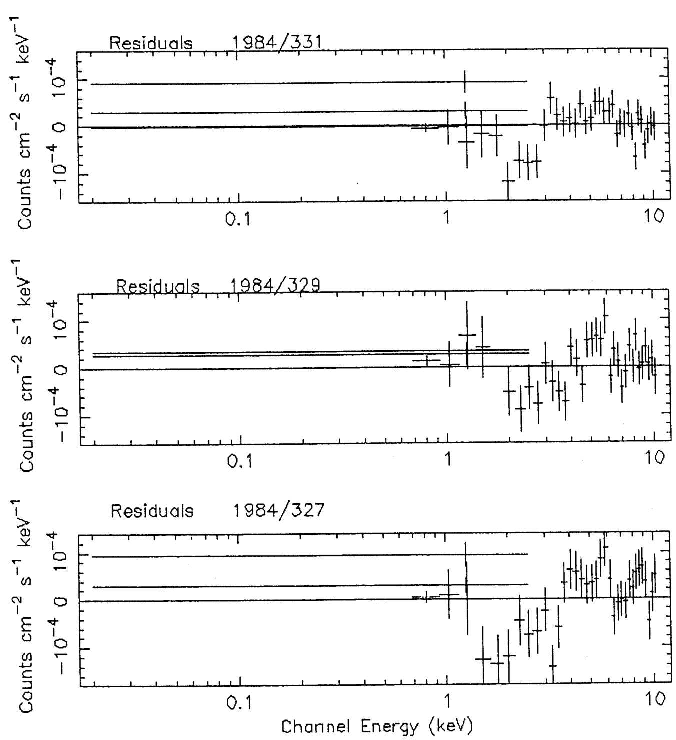

FIG. 3*b*

FIG. 3.—Residuals between the observed spectra and the model (power-law + fixed absorption) are plotted for six observations. This figure clearly shows the presence of soft excess in MCG 2-58-22 which is also variable.

TABLE 4

SPECTRAL FITS TO THE SPECTRA OF MCG 2-58-22: MODEL 3: TWO POWER-LAW + FIXED ABSORPTION[a]

DATE (1984)	Γ_1[b]	N_1[c]	Γ_2[b]	N_2[c]	FLUX[d] 0.1–2 (keV)	FLUX[d] 2–10 (keV)	L_X[e] 0.1–2 (keV)	L_X[e] 2–10 (keV)	χ_r^2/d.o.f.
321	$5.03^{+4.98}_{-1.97}$	$0.17^{+2.00}_{-0.14}$	$1.52^{+0.07}_{-0.10}$	$5.98^{+0.59}_{-0.98}$	1.84 ± 0.17	3.24 ± 0.38	1.83 ± 0.17	3.22 ± 0.38	0.80/29
322	$3.37^{+2.00}_{-1.08}$	$1.11^{+3.82}_{-1.09}$	$1.51^{+0.11}_{-0.20}$	$5.62^{+1.06}_{-2.92}$	1.91 ± 0.15	3.15 ± 0.26	1.90 ± 0.15	3.13 ± 0.26	0.99/29
325	$3.36^{+3.17}_{-2.68}$	$1.27^{+6.26}_{-1.07}$	$1.45^{+0.13}_{-0.20}$	$5.53^{+1.22}_{-4.75}$	1.96 ± 0.16	3.41 ± 0.32	1.95 ± 0.16	3.39 ± 0.32	0.79/29
327	$3.46^{+2.21}_{-1.23}$	$1.37^{+5.76}_{-1.08}$	$1.48^{+0.13}_{-0.10}$	$5.98^{+1.24}_{-4.21}$	2.16 ± 0.15	3.47 ± 0.28	2.14 ± 0.15	3.45 ± 0.28	0.97/29
329	$2.31^{+1.44}_{-0.38}$	$5.40^{+1.66}_{-4.73}$	$1.26^{+0.64}_{-0.50}$	$3.10^{+3.96}_{-2.59}$	2.29 ± 0.18	3.43 ± 0.25	2.28 ± 0.18	3.41 ± 0.25	1.10/29
331	$3.96^{+3.09}_{-1.28}$	$0.59^{+2.66}_{-0.48}$	$1.60^{+0.08}_{-0.16}$	$6.36^{+0.80}_{-1.81}$	2.02 ± 0.14	3.03 ± 0.27	2.01 ± 0.14	3.01 ± 0.27	0.84/30

[a] Fixed at the Galactic N_H value (3.4×10^{20} cm^{-2}).
[b] Photon index.
[c] Normalization in 10^{-3} photons cm^{-2} s^{-1} keV^{-1} at 1 keV.
[d] Flux in 10^{-11} ergs cm^{-2} s^{-1}.
[e] Luminosity in 10^{44} ergs s^{-1}.

observations, (1.48 ± 0.30), is in close agreement with that obtained from *HEAO 1* ($1.55^{+0.10}_{-0.04}$), *HEAO 2* (1.53 ± 0.25; Mushotzky 1984), and *Einstein* SSS + MPC ($1.45^{+0.21}_{-0.07}$ and 1.49 ± 0.11, Holt et al. 1989) data. However, the values of Γ of MCG 2-58-22 obtained from the ME and LE+ME fits by Pounds & Turner (1988) and Turner & Pounds (1989), are steeper than the above values.

Recent results obtained from *EXOSAT* and *Ginga* have displayed strong evidence for the presence of iron-K shell emission and absorption in the X-ray spectra of many Seyfert galaxies (Leighly, Pounds, & Turner 1989; Nandra et al. 1989; Pounds et al. 1989; Ghosh & Soundararajaperumal 1991; Piro, Yamauchi, & Matsuoka 1990 and references therein). Also, the residuals presented in Figure 3 show the presence of an emission line around 6.0 keV which gives a clear indication that a Gaussian line feature has to be added with the two power-law model. Therefore, this line feature with a fixed width of 0.1 keV (since the ME spectral resolution at 6.0 keV is about 1.2 keV FWHM, so there will not be any difference for the results if the line width is within the limit of the spectral resolution; thus we have fixed the value of the line width at 0.1 keV which is usually followed by others) and a variable line center was added with the two power-law and fixed absorption model (model 3). This model (model 4) was used to fit the spectra of MCG 2-58-22. The best-fit parameters with 90% confidence error bars, obtained from the present fit, are listed in Table 5. From χ_r^2 statistics we find that there are definite improvements in the fit with the addition of the Gaussian line around 6.0 keV and the *F*-statistics show that the inclusion of the Gaussian line is highly (99.99%) significant. In Figure 8 we show the observed LE and ME spectra, shown earlier, along with the best-fit power law, fixed absorption and a Gaussian line model convolved through the detector response. Also the residuals between the model and data are shown in the lower panel. From the best-fit parameters we find that the mean line center energy (see Table 5) is consistent with 6.11 keV, the value expected from the redshifted cold iron. The best-fit equiv-

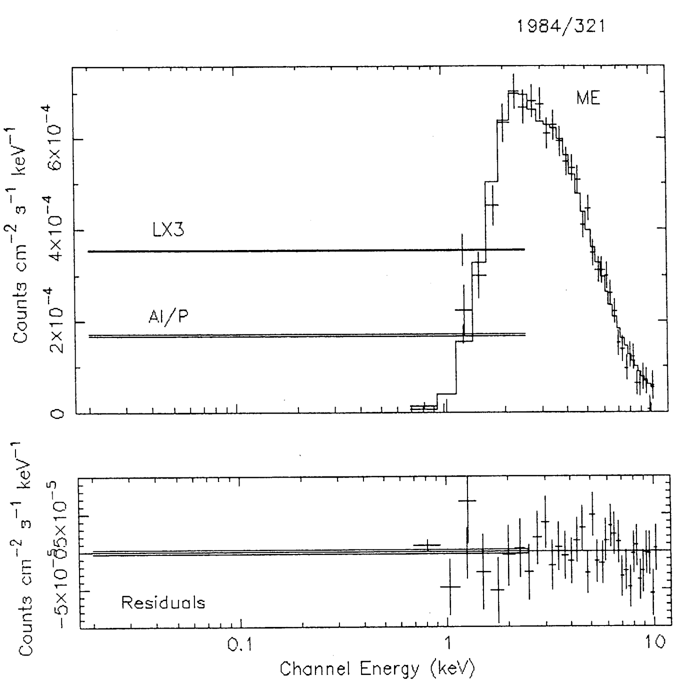

FIG. 4.—Observed spectrum of MCG 2-58-22 fitted with two power-law + fixed absorption model. Lower panel of the figure shows the residuals between the spectrum and the model.

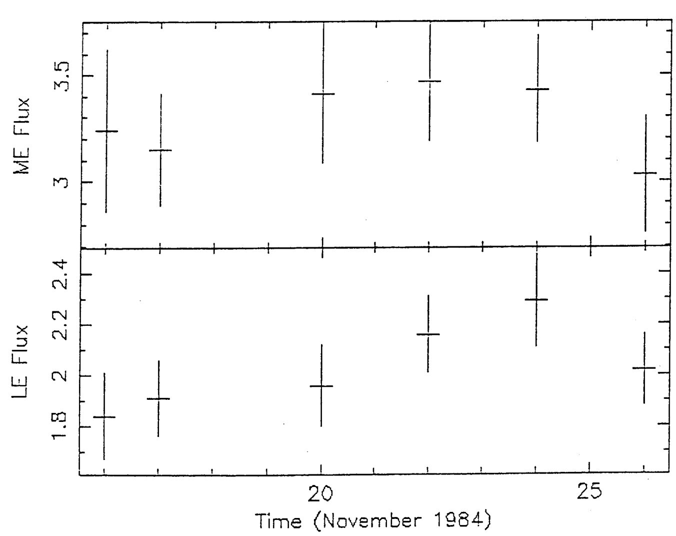

FIG. 5.—Plot of the LE and ME fluxes vs. date of observations

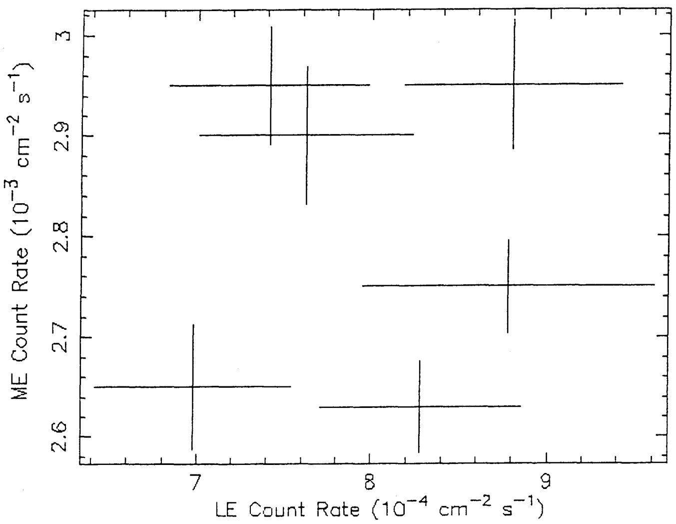

FIG. 6.—Plot of the LE count rate vs. ME count rate

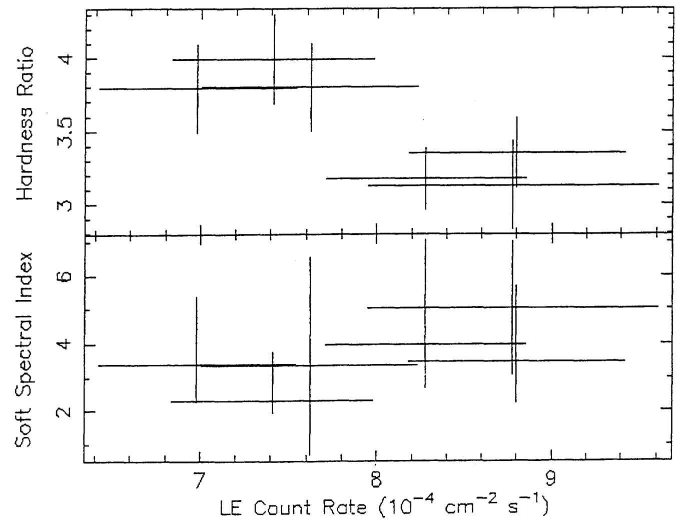

FIG. 7.—Plot of the LE count rate vs. soft spectral index, obtained from two power-law fits (*lower panel*) and hardness ratio of the source (*upper panel*).

alent width of the iron lines is around 160 ± 110 eV (90% confidence). Only statistical errors have been taken into account to compute the uncertainties in the equivalent width measurements.

4. DISCUSSION

The X-ray luminosity of MCG 2-58-22 as observed with *EXOSAT* on six epochs, between 1984 November 16 and 26, in the soft energy band (0.1–2 keV) varied between $(1.83 \pm 0.17) \times 10^{44}$ ergs s^{-1} and $(2.28 \pm 0.18) \times 10^{44}$ ergs s^{-1} and that in the hard energy (2–10 keV) range was almost unchanged during the period of *EXOSAT* observations. From the comparison of the X-ray luminosities of this source measured by *Einstein* SSS + MPC (4.18×10^{44} ergs s^{-1}), *HEAO 1* and *HEAO 2* (5.0×10^{44} ergs s^{-1}), and *EXOSAT* (3.10×10^{44} ergs s^{-1}), it is seen that there were no dramatic long-term variations in it.

X-ray observations of MCG 2-58-22 prior to *EXOSAT* could not detect the presence of soft excess in this galaxy. However, from the present results obtained from *EXOSAT* LE + ME data sets, it is evident that soft excess is present in this Seyfert galaxy. Also it can be seen from Figure 8 that the soft excess is variable on the time scale of a day (between 1984/321 and 1984/322).

Presence of soft excess in Seyfert galaxies is a common feature (Turner & Pounds 1989; Kruper et al. 1990; Ghosh & Soundararajaperumal 1992). It has been suggested that the soft excess detected in AGNs may be due to the high-energy tail of an accretion disk spectrum (Pounds et al. 1986; Bechtold et al. 1987) or due to thermal bremsstrahlung emission from the confining medium of the broad-line or narrow-line clouds (Pounds et al. 1986). Since the thermal bremsstrahlung model did not provide an acceptable fit to the data sets, so it is suggested that the detected soft excess in MCG 2-58-22 may be due to the high-energy tail of an accretion disk spectrum (Pounds et al. 1986; Bechtold et al. 1987). Again, from our results, we find that the soft spectral index of MCG 2-58-22 is at a maximum when the hardness ratio is at a minimum (Fig. 7). Also, we find that the variations of the LE count rates are correlated and anticorrelated with the variations of the soft spectral index and the hardness ratio of the source, respectively (Fig. 7). However, the LE and ME count rates are uncorrelated (Fig. 6), even though it appears that they varied in concert (Fig. 1). This is because of the relative variations of the two count

TABLE 5

SPECTRAL FITS TO THE SPECTRA OF MCG 2-58-22: MODEL 4: TWO POWER-LAW + FIXED ABSORPTION[a] + GAUSSIAN LINE

Date (1984)	Γ_1[b]	N_1[c]	Γ_2[b]	N_2[c]	E_L[d]	E_N[e]	EW[f]	χ_r^2/d.o.f.
321..........	$5.12^{+4.72}_{-2.14}$	$0.18^{+1.75}_{-0.09}$	$1.56^{+0.09}_{-0.10}$	$6.34^{+0.70}_{-0.90}$	$6.13^{+1.08}_{-1.05}$	$0.72^{+0.53}_{-0.52}$	154 ± 110	0.50/27
322..........	$3.33^{+2.69}_{-2.49}$	$1.82^{+6.17}_{-1.68}$	$1.54^{+0.18}_{-1.11}$	$5.39^{+1.78}_{-5.18}$	$4.81^{+0.41}_{-0.32}$	$1.48^{+0.78}_{-0.76}$	198 ± 103	0.61/27
325..........	$3.46^{+3.90}_{-3.28}$	$1.05^{+6.10}_{-0.95}$	$1.49^{+0.15}_{-1.31}$	$5.83^{+1.33}_{-4.97}$	$6.47^{+0.84}_{-0.63}$	$0.54^{+0.41}_{-0.42}$	122 ± 95	0.64/27
327..........	$3.06^{+2.46}_{-2.85}$	$2.28^{+4.26}_{-1.93}$	$1.45^{+0.17}_{-0.29}$	$5.42^{+2.31}_{-5.24}$	$5.81^{+0.88}_{-0.76}$	$0.57^{+0.45}_{-0.47}$	132 ± 109	0.82/27
329..........	$2.51^{+1.88}_{-1.96}$	$5.97^{+2.37}_{-3.22}$	$1.32^{+0.31}_{-0.46}$	$2.82^{+0.43}_{-1.32}$	$5.60^{+0.62}_{-0.50}$	$1.30^{+0.80}_{-0.80}$	206 ± 126	0.78/27
331..........	$4.23^{+3.72}_{-2.60}$	$0.37^{+2.62}_{-0.34}$	$1.66^{+0.10}_{-0.16}$	$6.78^{+0.88}_{-1.84}$	$5.67^{+0.68}_{-0.83}$	$0.69^{+0.64}_{-0.64}$	145 ± 134	0.76/28

[a] Fixed at the Galactic N_H value (3.4×10^{20} cm^{-2}).
[b] Photon index.
[c] Normalization in 10^{-3} photons cm^{-2} s^{-1} keV^{-1} at 1 keV.
[d] Line energy in keV.
[e] Line intensity in 10^{-4} photons cm^{-2} s^{-1}.
[f] Equivalent width in eV.

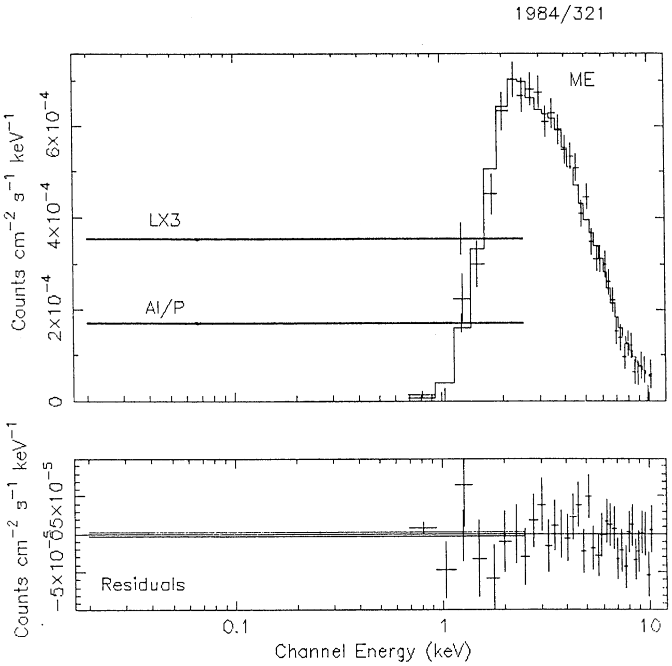

FIG. 8.—Observed spectrum of MCG 2-58-22 fitted with the power-law + fixed absorption + Gaussian line model. Lower panel of the figure shows the residuals between the spectra and the model.

rates. It has also been found that the hard spectral index (Γ_2) remained almost unchanged during the *EXOSAT* observations, and the variations of the ME count rates were independent of the variations of the hardness ratio of the source. All these results suggest that the soft (LE) and hard (ME) X-rays have different origins, and the soft excess of this galaxy depends on the physical conditions of the soft X-ray region of this source. However, the basic mechanisms behind the origin and the variability of soft excess are yet largely unknown, and at present it is difficult to draw any definite conclusions about it.

From the measured line center energy (5.8 ± 0.7 keV) of the detected emission line, it is suggested that this line is consistent, considering the 90% confidence error bars, with the redshifted 6.4 keV fluorescent iron line which might have originated due to the reprocessing of the X-ray continuum in a cold accretion disk and the equivalent width for such line will be around ~ 100 eV (George et al. 1989). Also, the model predictions on the equivalent widths of the fluorescent iron line, when the matter of cosmic chemical composition is assumed to be distributed in a cold disk seen face-on, are about 150 eV if the disk surface is flat, 180 eV if the surface is conical, and 230 eV if the surface is concave (Matt, Perola, & Piro 1991). However, our measured value of the equivalent width of this line is 160 ± 110 eV. This suggests that the detected emission line in the X-ray spectrum of MCG 2-58-22 may be due to the fluorescence of the redshifted 6.4 keV cold iron from an centrally illuminated accretion disk seen face-on. At present it is not possible to make any definite suggestion, based on the measured equivalent width of the iron line, regarding the geometrical shape of the surface of the accretion disk.

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