The IR spectral energy distribution of the Seyfert 2 prototype NGC 5252

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ABSTRACT

The complete mid- to far- infrared continuum energy distribution collected with the Infrared Space Observatory of the Seyfert 2 prototype NGC 5252 is presented. ISOCAM images taken in the 3–15 μm show a resolved central source that is consistent at all bands with a region of about 1.3 kpc in size. Due to the lack of on going star formation in the disk of the galaxy, this resolved emission is associated with either dust heated in the nuclear active region or with bremsstrahlung emission from the nuclear and extended ionised gas. The size of the mid-IR emission contrasts with the standard unification scenario envisaging a compact dusty structure surrounding and hiding the active nucleus and the broad line region.

The mid IR data are complemented with ISOPHOT aperture photometry in the 25–200 μm range. The overall IR spectral energy distribution is dominated by a well-defined component peaking at ~ 100 μm, a characteristic temperature of T\textasciitilde 20 K and an associated dust mass of 2.5 \times 10^7 M_☉ which greatly dominates the total dust mass content of the galaxy. The heating mechanism of this dust is probably the interstellar radiation field. After subtracting the contribution of this cold dust component, the bulk of the residual emission is attributed to dust heated within the nuclear environment. Its luminosity consistently accounts for the reprocessing of the X-ray to UV emission derived for the nucleus of this galaxy. The comparison of NGC 5252 spectral energy distribution with current torus models favors large nuclear disk structure on the kiloparsec scale.

Subject headings: galaxies: individual (NGC 5252) - galaxies: Seyfert - galaxies: active - galaxies: photometry - infrared: galaxies
1. Introduction

NGC 5252 is one of the best examples of anisotropy of the nuclear radiation field. It exhibits a perfect biconical morphology of extranuclear ionized gas (Tadhunter & Tsvetanov 1989), extending out to $\sim 45''–50''$, equivalent to $\sim 20$ kpc$^1$ and neutral HI gas filling the regions outside the bicone of ionized gas (Prieto & Freudling 1993). Such selective distribution of gas implies an intrinsically collimated radiation field at least at the extended narrow line region scale.

NGC 5252 has been subjected to a wide range of multi-wavelength observations from the X-ray to the radio domain. A large fraction of the observations were aimed at revealing the nature and geometry of the postulated obscuring material responsible for blocking the nuclear light in directions outside the bicone of ionized gas. The observational evidence points to a heavily obscured nucleus and the broad line region (BLR): a band of red material lying across the nucleus and perpendicular to the bicone of ionized gas is seen in near IR–optical ratio maps of the galaxy (Kotilainen & Prieto 1995). The presence of an obscured nucleus is also confirmed in the high energy domain. The $0.4 – 10$ keV ASCA spectrum of the galaxy (Cappi et al. 1996) reveals a heavily obscured nucleus with $N(H) \sim 4.3 \times 10^{22}$ cm$^{-2}$. This implies about 20 mag of extinction in the visible, sufficient to absorb all the nuclear optical and UV light in the line of sight. On the other hand, broad permitted lines have been observed in the optical (Acosta–Pulido et al. 1996; Osterbrock & Martel 1993) and NIR range (Ruiz, Rieke, & Schmidt 1994; Goodrich et al. 1994). The modeling of the nuclear spectral energy distribution (SED) and line spectrum in NGC 5252 is consistent with the nuclear ionizing radiation being heavily absorbed (Contini, Prieto, & Viegas 1998).

Because of the heavy central obscuration advocated by the above observations, the mid to far IR region becomes an ideal window for studying the nuclear emission in detail. The 20 mag extinction measured in the optical reduces to about 1.5 mag at 10 $\mu$m. This paper presents new photometric data covering the mid to far IR range (from 3 $\mu$m to 200 $\mu$m). Together with near-IR data available from the literature, one of the most complete IR SED among Seyfert galaxies is presented. In contrast to most Seyfert galaxies, NGC 5252 shows no evidence for star–formation activity across its disk: H$\alpha$ imaging reveals the distribution of ionized gas to be restricted to the nucleus and the bicone only (Prieto & Freudling 1996, Tsvetanov et al. 1996). This unique advantage makes of NGC 5252 an ideal target for pursuing “clean” studies of its central nuclear emission.

$^1$NGC 5252 has a redshift $z \simeq 0.0230$, which gives a scale of $\sim 433$ pc/arcsec, adopting $H_0 = 75$ km s$^{-1}$ Mpc$^{-1}$. 
2. The data

Mid-IR images of NGC 5252 were obtained in several filters using the ISOCAM instrument (Cesarsky et al. 1996) on board ISO\(^2\). A total of eight filters were used (see Table 1): five centered on the continuum at 15, 14.5, 11.37, 6.75, and 3.72 \(\mu\)m respectively and three in the PAH emission at 3.3 \(\mu\)m, CO line at 4.7 \(\mu\)m and the broad Si absorption feature at 9.63 \(\mu\)m respectively. The pixel field of view was 3 arcsec. All images were collected following a micro–scanning pattern of 3 x 3 points, and a step size of 2 arcsec in both x and y directions. In this way the PSF was oversampled, which allows a better detection of possible extended emission. The data were processed using the version 4.0 of CIA (Ott et al. 1997). This was used for dark signal subtraction, deglitching, drift correction (for the LW camera) using Fouks & Schubert (1995) formula, flat–fielding, flux calibration, and mosaicing. Unfortunately, the images in the 3.3 and 4.7 \(\mu\)m filters (taken with the SW camera) are affected by hysteresis that could not be corrected.

Integrated aperture photometry in the 25 to 200 \(\mu\)m range measured by ISOPHOT (Lemke et al. 1996) are also presented. The ISOPHOT data were reduced using PIA v9.1 (Gabriel et al. 1997) following the standard signal corrections (\(?\)\(^3\)) except for signal non-linearity, which was not applied. The observation in chopped mode at 25 \(\mu\)m was calibrated by using a mean value of detector responsivity corrected for systematic variation with orbital position (Abraham et al. 2001). In the other cases, the internal calibrators were used to determine the responsivity. Due to the faintness of the source, the fluxes at 60 and 90 \(\mu\)m were derived using only the central pixel of the ISOPHOT–C100 array, after correction by signal losses due to partial covering of the PSF. These values were re-calibrated by the scaling factors 0.8 and 1.27, at 60 and 90 \(\mu\)m, respectively. These scaling factors were derived after comparison of the fluxes as measured by ISOPHOT at those bands and measured by IRAS at 60 and 100 \(\mu\)m of a sample of CfA Seyfert galaxies (González–Hernández et al., in preparation). The IRAS data at 60 and 100 \(\mu\)m (Edelson, Malkan, & Rieke 1987) were also included in the analysis. The fluxes measured at filters beyond 120 \(\mu\)m were re-calibrated after comparison of the background measurements with respect to the corresponding values in the COBE/DIRBE maps.

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\(^2\)Based on observations with ISO, an ESA project with instruments funded by ESA Member States (especially the PI countries: France, Germany, the Netherlands and the United Kingdom and with the participation of ISAS and NASA.

Table 1. Nuclear photometry of NGC 5252

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<tr>
<th>Filter</th>
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<th>Ap.</th>
<th>$F_\nu$ [mJy]</th>
<th>Ref.</th>
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<tr>
<td>5230(\AA)</td>
<td>0.52</td>
<td>3</td>
<td>1.1</td>
<td>1</td>
</tr>
<tr>
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<td>nuc</td>
<td>0.012</td>
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</tr>
<tr>
<td>7027(\AA)</td>
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<td>1</td>
</tr>
<tr>
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<td>0.70</td>
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<td>3</td>
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<td>570 $\pm$ 160</td>
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<td>CO(1-0)</td>
<td>2677</td>
<td></td>
<td></td>
<td>4</td>
</tr>
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</table>

Note. — Colons indicate an upper limit.

References. — 1 - Kotilainen & Prieto (1995); 2 - this article; 3 - Edelson, Malkan, & Rieke (1987); 4 - Prieto & Freudling (1996).
3. Results

3.1. Extended Mid IR Emission

The IR emission of NGC 5252 in the ISOCAM images (3-15um range) shows concentrated to the nuclear region; yet, the emission is however marginally extended in all the filters. The extended nature of the emission was assessed in the two following ways. First, each image was compared with the modeled ISOCAM point spread function (PSF) corresponding to each filter (Okumura 1998). In all cases, the galaxy profile was found broader than the theoretical PSF. Second, a comparison with a measurement of a calibration star observed with exactly the same raster configuration as that used for NGC 5252 was used. This comparison could only be done at 15µm (LW3 filter) as no other stars with the same observation configuration exist in the ISO archive (Fig. 1). This comparison was conclusive. The measured FWHM of the galaxy profile at 15µm is 5.6" whereas that of the stellar profile is 4.6" (Fig. 1). After de-convolving for the PSF width, an extension of \(\approx 3.3\) arcsec consistent in all filters is found.\(^5\) The compactness of the emission in the ISOCAM images hampers any assessment on the morphology definition.

Previous claims regarding the presence of obscuring structure in the circumnuclear region of this galaxy are reported by Kotilainen & Prieto (1995): a redder nuclear band, perpendicular to the ionized gas bicone and extending \(\sim 5"\) E–W across the nucleus was found in near-IR optical colour maps. Tsvetanov et al. (1996), on the basis of HST optical observations reported on a D-shaped obscuring structure N-E of the nucleus with a size of \(\sim 3"\) was reported. Thus, although the morphology of the mid-IR emission is undetermined, its size is consistent with that of the reported obscuring nuclear structures seen in the near-IR and optical images.

There are few Seyfert galaxies in which the mid-IR emission is known to be extended. In NGC 1068, the emission from 7.9 to 25 µm extends over few arcseconds, aligning with the radio jet and roughly correlating with the [OIII] morphology (Cameron et al. 1993; Bock et al. 2000). Bock et al. (2000) found that about 2/3 of the total emission is contained in an unresolved central core (0.1" resolution) and the other 1/3 in the extended emission. Krabbe, Böker, & Maiolino (2001) report on the detection of extended mid IR emission in Circinus and NGC 3281.

\(^{4}\)ISOCAM PSF report is available at http://www.iso.vilspa.esa.es/users/expllib/CAM_list.html

\(^{5}\)There are slight discrepancies between the theoretical PSF and that of the star profile which affect the peak of the function and the wings (see discussion by Okumura, 1998). However the difference between the FWHM of both PSFs never exceeds 10% for the filters used here.
Fig. 1.— Normalized radial intensity profiles of NGC 5252 at 15 µm (continuous line). For comparison, the theoretical (dashed line) and the observed (dotted line) PSFs are also shown. The horizontal line represents the detection limit as measured by the 3σ of the image background. The ratio between the NGC 5252 radial profile and the observed PSF is represented in the bottom panel. The difference between the theoretical and the observed PSFs at the inner radii is due to the pixel sampling.
3.2. IR Spectral Energy Distribution

The IR spectral energy distribution of NGC 5252 including the new ISOCAM and ISOPHOT data is shown in Fig. 2. The stellar-subtracted nuclear continuum fluxes in the near IR to optical range by Kotilainen & Prieto (1995) are also shown. A clear feature in the SED is the prominent bump enclosing the 60 to 200 µm range and dominating the continuum emission.

Up to IRAS, the bulk of IR emission in active galaxies has in general been associated with dust reprocessing of the intense UV–optical nuclear radiation. Although still lacking spatial resolution, the wider wavelength coverage and better sampling of the IR continuum by ISO has allowed Pérez García & Rodríguez Espinosa (2001) to discern three main IR components in the SED of Seyfert galaxies. These are a very cold component (T ∼ 15 – 20 K), corresponding to dust heated by the interstellar radiation field; a cold component (T ∼ 40 – 50 K), which is associated with star forming regions; and a warm component (T ∼ 100 – 200 K) associated with dust heated by the active nucleus and/or nuclear starbursts. As our IR wavelength coverage for NGC 5252 gets up to the near-IR, a simple parametrization of its SED as the sum of a minimum number of modified blackbodies was introduced. This parametrization has the purpose of getting a characteristic value of the luminosity, temperature and mass of the typical dust. Fig. 2 shows the fit to the SED as the sum of a minimum five modified blackbodies with T = 20, 50, 175, 600, and 1500 K. It should be stressed that regardless of this parametrization, the local bump at 90–200 µm is by itself well defined by a single modified blackbody with T ∼ 20 K. We will single out this component as a different one from the rest of the IR SED. The arguments are as follows.

Danese et al. (1992) shown that most of the far IR (IRAS at 60 and 100 µm) emission in Seyfert galaxies is unrelated to nuclear activity. Pérez García & Rodríguez Espinosa (2001) and Acosta–Pulido et al. (2001) reached the same conclusion on the basis of a much wider and better sampled spectral energy range covered by the 16–200 µm ISOPHOT data. Recently Prieto Pérez García & Rodríguez Espinosa (2001, 2002) show that the X-ray emission and the coronal line emission in Seyfert galaxies, both being typical indicators of the nuclear activity, are correlated with the mid-IR emission but unrelated to the far IR emission. In the case of NGC 5252, the lack of star formation in the disk of the galaxy (sect. 1), the absence of dust lanes or knots across its disk, as evidenced in optical-IR colour maps

\[\text{We have also tried the inversion method described by Pérez García, Rodríguez Espinosa, & Santolaya Rey (1998). Their method yields seven components with the following temperatures T = 20, 50, 133, 182, 380, 820 and 1500 K. The differences between our decomposition and theirs appear at the gaps in the SED (2 to 7 µm and 25 to 60 µm), however the main components at 20 and 50 K are preserved.}\]
(Kotilainen & Prieto 1995), the compactness of the emission in the 3–15µm range, lead us to argue that the bulk of the near- to mid- IR emission is of nuclear origin whereas the far-IR emission, represented by the 20 K component, is a separate component unrelated to the nuclear activity. This component is associated with the galaxy as a whole and is most probably due to dust heated uniformly across the galaxy by the interstellar radiation field.

The luminosity, temperature and dust mass associated with the galaxy component (20 K) and with the nuclear component (sum of the other blackbodies) was estimated following Kennicutt (1998) and is provided in Table 2.

4. Discussion

4.1. Origin of the Extended Mid IR emission

The size of the extended mid-IR emission detected in NGC 5252 corresponds to a emitting region of \( \sim 1.3 \) kpc.

Accordingly to the previous SED decomposition, dust emitting at the mid IR waves should reach temperatures \( \simeq 175 \) K (see also Pérez García & Rodríguez Espinosa (2001). The luminosity associated with this warm component is \( 1.1 \times 10^{-11} \) erg cm\(^{-2}\) s\(^{-1}\). Most of this emission should come from the nucleus but not necessarily all. For example, in NGC 1068, 1/3 of the 10µm emission is extended across the nucleus. Some plausible mechanisms for heating the dust to such temperatures outside the nucleus include intense star formation, shocks, and the nuclear radiation.

In NGC 5252, a circumnuclear starburst can be ruled out (cf. Sect. 1). In addition, the colours of the galaxy in the circumnuclear region are compatible with those of a passively

<table>
<thead>
<tr>
<th>Comp.</th>
<th>Temp [K]</th>
<th>( F_{\text{IR}} ) [erg cm(^{-2}) s(^{-1})]</th>
<th>( L_{\text{IR}} ) [erg s(^{-1})]</th>
<th>( M_{\text{dust}} ) [M(_{\odot})]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Galaxy</td>
<td>20±4</td>
<td>( (1.7 \pm 0.5) \times 10^{-11} )</td>
<td>( (1.8 \pm 0.5) \times 10^{43} )</td>
<td>( (2.5 \pm 1.0) \times 10^{7} )</td>
</tr>
<tr>
<td>Nuclear</td>
<td>50 – 1500</td>
<td>( (5.0 \pm 0.8) \times 10^{-11} )</td>
<td>( (5.3 \pm 0.8) \times 10^{43} )</td>
<td>( 1.0 \times 10^{5} )</td>
</tr>
<tr>
<td>Total</td>
<td>...</td>
<td>( (6.2) \times 10^{-11} )</td>
<td>( (6.5) \times 10^{43} )</td>
<td>( (2.5 \pm 1.0) \times 10^{7} )</td>
</tr>
</tbody>
</table>
Fig. 2.— IR Spectral energy distribution of NGC 5252. Circles represent ISOPHOT photometric data; diamonds, ISOCAM data; triangles, IRAS data. For sake of clarity, IRAS upper limits at 12 and 25 µm are not included. The open and filled squares represent the 3" aperture and stellar-subtracted nuclear fluxes, respectively from Kotilainen & Prieto (1995). Two upper limits in the submillimetric range are included (Prieto & Freudling 1996). The continuous line is a parametrization of the SED as the sum of five modified blackbodies with T = 20, 50, 175, 600, and 1500 K. The coolest component is represented by the dashed line and the other blackbody components as dotted lines. The SED shows its maximum at \( \sim 100 \, \mu m \).
evolved elliptical with moderate extinction (Kotilainen & Prieto 1995).

Heating by the nuclear radiation is not trivial if thermal equilibrium between dust grains and the nuclear radiation has to prevail. The nuclear luminosity of NGC 5252 is estimated \( L_f \sim (0.8 - 6.7) \times 10^{10} \, L_{\odot} \) (Kotilainen & Prieto 1995), the range reflects the variation in power-law spectral index, \( f \) is the covering factor. For \( T = 175 \, \text{K} \), the dust should be placed to a maximum distance from the nucleus of \( R = 12 - 30 \, \text{pc} \). This is a factor 50 to 20 below the size of the emission at 15\( \mu \text{m} \), \( \sim 650 \, \text{pc} \) radius. The nuclear luminosity may be greatly underestimated if the covering factor of the ionized gas is much lower than unity. Still, to increase \( R \) by a factor of 10 the luminosity should increase by factor 100. However, most important is the fact that the presumed thermal equilibrium cannot be applied to very small grains and PAHs which are transiently heated to high temperatures by a single photon absorption, later re-emitting their energy in the mid IR. It is worth mentioning that the extended mid-IR emission in NGC 1068 does not present a radial variation of the color temperature as expected for a uniform distribution of dust grains (Bock et al. 2000). That could be explained in terms of very small grains transiently heated by the nuclear radiation field. The presence of PAHs in NGC 5252 cannot be confirmed from the present data. PAH emission is however claimed to be a general feature in the spectrum of Seyfert 2 galaxies (Clavel et al. 2000); yet, this emission is most probably linked to circumnuclear star-forming regions though. Interestingly, to account for the near-IR emission in NGC 1068, Efstathiou, Hough, & Young (1996) propose the existence of optically thin dust distributed within the ionization cone. The extended mid IR emission in NGC 5252 may have similar origin.

Dust could also be heated by shocks, associated e.g., with the propagation of the radio jet. The modeling of the nuclear SED and line spectrum requires of shock excitation coupled with photoionization to provide a self-consistent account of the X-rays to radio properties of this galaxy Contini, Prieto, & Viegas (1998). Shocks however do not appear to play a key role in the extended emission line spectrum of the galaxy which Contini et al found it to be dominated by the nuclear radiation only. Therefore, it seems improbable that the extended mid-IR emission be due to shock-heated dust.

An alternative possibility for the origin of the extended mid-IR is bremsstrahlung emission due the mandatory cooling process of the photoionised and shock heated gas. The bremsstrahlung component peaks in the optical-UV range but its slowing decreasing tail, particularly in the near to mid IR range, can largely dominate the nuclear SED at these waves (see Contini & Viegas 2000 for a thorough discussion). Thus, the extended near-to mid-IR emission in NGC 5252, also perhaps in NGC 1068, may be association with bremsstrahlung from the nuclear and extended ionized gas in the bicone.
4.2. The nuclear IR emission

On the arguments provided in sect. 3.2, the IR SED of NGC 5252 was separated into two main components: a nuclear component and a cold component (T\sim 20 K) associated with the galaxy as a whole. Because of the well definition of the 20 K galaxy component, the nuclear contribution could be isolated by subtracting that galaxy component from the total emission. The inferred IR luminosity for the residual component is $5.3 \times 10^{43}$ erg s$^{-1}$ (see Table 2). Kotilainen & Prieto (1995) provided an estimate for the hidden, nuclear optical/UV luminosity expected to be reprocessed by circumnuclear dust to be $L_{\text{repr}} \sim 2.6 - 8.5 \times 10^{43}$ erg s$^{-1}$ (range varies depending on the assumed power-law spectral index of the ionizing radiation). Despite the uncertainties, both independently derived luminosities are in fair agreement and thus consistent with reprocessing of the nuclear radiation by circumnuclear dust.

The estimated mass of dust from the residual component is $\sim 10^5 M_\odot$ (Table 2). An alternative estimate of the mass of dust in the nucleus can be derived from extinction measurements. Kotilainen & Prieto (1995) found that the stellar galactic (in a 6"–12" ring) and nuclear (within a 3" region) light suffer an extinction of $A_V \sim 0.5$ mag and $A_V \sim 1$ mag, respectively. Assuming a canonical dust to gas mass ratio, those values imply dust masses of $6.7 \times 10^5 M_\odot$ and $1.2 \times 10^5 M_\odot$, respectively, in good agreement with the value for the nuclear component derived here (Table 2).

The residual SED after removal of the galaxy component is shown in Fig. 3. First to notice is the width of the nuclear IR bump, which covers about 2 decades in wavelength. This “nuclear” SED is compared with current torus models next. The best compromise was found with Granato & Danese (1994) models. These are flared disk configurations characterized by a large radial extension, up to hundreds of parsecs, and a moderate optical thickness. Other models, such as the compact torus proposed by (Pier & Krolik 1993) or the tapered disks by Efstathiou et al. (1996), would need additional components to account for the width of the bump and the near IR part of the SED. Fig. 3 shows the proposed model for NGC 1068 by Granato & Danese (1994) on top of NGC 5252 nuclear SED. The overall match is remarkable, and indicates that models supporting large disk structures should be further explored.

4.3. Very Cold Dust Emission

The IR luminosity and dust mass associated with the T \sim 20 K component are given in Table 2. This component dominates the dust mass content of the galaxy. It is therefore
Fig. 3.— Residual SED after removing the galaxy component. Symbols are as in Figure 2. Simple crosses represent the far IR data after subtracting the 20 K component. The model proposed by Granato & Danese (1994) for NGC 1068 is shown as dashed line. Note the large width of the IR bump, about two decades on wavelength.
worth comparing it with alternative galaxy mass estimates and with those derived from other galaxies of similar morphological type.

The dust mass derived from extinction measurements in the circumnuclear region of NGC 5252 (sect. 4.2) is about a factor 100 below that inferred from the galaxy component (Table 2). Therefore, there is more dust in NGC 5252 apart from that detected in the circumnuclear region. Prieto & Freudling (1996) found HI emission distributed outside the ionization cones and extending about 1 arcmin. A total mass of neutral gas of $1.8 \times 10^9 \, M_\odot$ is derived (an upper limit for the molecular gas of $3.6 \times 10^8 \, M_\odot$ is derived from millimetric observations). If compared the HI mass with that derived from the 20 K component, a gas to dust ratio of $\sim 98$ is found, very close to the canonical value. This suggests that the cold dust is probably related to the neutral gas and most probably spread throughout the galaxy.

It is known since IRAS that early–type galaxies are not entirely devoid of interstellar material (Young et al. 1989), and NGC 5252 is not an exception. Bregman et al. (1998) studied the IRAS 60 and 100 $\mu$m emission of a sample of normal elliptical and S0 and interpreted the emission as due to dust being extended throughout the galaxy and therefore, difficult to detect as obscuration patches. Their derived dust temperatures are likely overestimated since 100 $\mu$m is not yet on the falling turnover of the SED, hence the dust masses are expected to be underestimated. For comparative purposes, the temperature and mass of the dust in NGC 5252 using the IRAS 60 and 100 $\mu$m fluxes only, were derived. These yield $T_{\text{dust}} \sim 40 \, K$ and $M \sim 1.4 \times 10^6 \, M_\odot$ respectively. Both values are well within the range found in Bregman’s sample but close to the highest ones, which may be due to the fact that NGC 5252 harbors an active nucleus.

5. Conclusions

Based on new mid- and far- IR data collected with ISOCAM and ISOPHOT instruments, a detailed IR SED of the Seyfert 2 prototype NGC 5252 is presented. The main results are as follows.

- The IR SED of NGC 5252 can be disentangled into two main components: a nuclear component accounting for the bulk of the luminosity in the 1 – 60 $\mu$m range, and a cold component ($T \simeq 20 \, K$), peaking at about 100 $\mu$m, associated with the galaxy as a whole. The latter accounts for 25% of the total IR luminosity and almost the totality of the dust mass content of the galaxy.

- The mid IR emission (6–15 $\mu$m) detected in ISOCAM images is concentrated toward the nuclear region of the galaxy. This emission is however resolved in all ISOCAM
filters but its morphology is undefined. A limit for the size of the region is set to 3.3 arcsec, $\sim$1.3 kpc diameter. This size consistent with that of the nuclear obscuring structure seen in optical and near-IR colour maps of the galaxy. Possible origin for this extended emission includes small dust grains transiently heated by the nuclear radiation or bremsstrahlung from nuclear and extended ionised gas.

- Comparison of the SED with current torus models favours models supporting large scale disk structures. Indeed, the size of NGC 5252 central obscuring structure and of the mid-IR region point out to kpc-scale central disk.

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