We propose that the best sites to search for Soft Gamma Repeaters (SGRs) outside the Local Group are the galaxies with active massive-star formation. Different possibilities to observe SGR activity from these sites are discussed. In particular, we have searched for giant flares from the nearby galaxies (∼ 2–4 Mpc away) M82, M83, NGC 253, and NGC 4945 in the BATSE data. No candidate giant SGR flares were found. The absence of such detections implies that the rate of giant flares with energy release in the initial spike above $0.5 \times 10^{44}$ erg is less then $1/30 \text{yr}^{-1}$ in our Galaxy. However, hyperflares similar to the one of December 27, 2004 can be observed from larger distances. Nevertheless, we do not see any significant excess of short GRBs from the Virgo galaxy cluster as well as from the galaxies Arp 299 and NGC 3256 (both with extremely high star formation rate). This implies that the Galactic rate of hyperflares with energy release $\sim 10^{46}$ erg is less than $\sim 10^{-3} \text{yr}^{-1}$. With this constraint the fraction of possible extragalactic SGR hyperflares among BATSE’s short GRBs should not exceed few percents. We present the list of short GRBs coincident with the galaxies mentioned above, and discuss the possibility that some of them are SGR giant flares. We propose that the best target for the observations of extragalactic SGR flares with Swift is the Virgo cluster.

Key words: gamma-rays: bursts — galaxies: starbursts
1 INTRODUCTION

Soft gamma repeaters (SGRs) are one of the most puzzling types of neutron stars (NS). At present, at least four of them are known in our Galaxy and in the Large Magellanic Cloud (further, we will refer to all of them, including the ones in the LMC, as “Galactic” ) and there are also two candidates.\(^1\)

SGRs show three main types of bursts (however, these types form a continuous spectrum of transient behavior):

- weak bursts, \(L \lesssim 10^{41} \text{ erg s}^{-1}\);
- intermediate bursts, \(L \sim 10^{41} - 10^{43} \text{ erg s}^{-1}\);
- giant flares, \(L \lesssim 10^{45} \text{ erg s}^{-1}\).

The weak bursts are relatively frequent. About several hundreds have been detected from 4 sources during \(\sim 25\) yrs, i.e. the average rate is a few per month per source (for example, Cheng et al. (1996) report observations of 111 bursts from SGR 1806-20 during \(\sim 5\) years, see also Göğüs et al. (2000) where the authors presented hundreds of weak bursts and performed detailed simulations of their recurrence time). However, these bursts appear in groups during the periods of activity of a SGR, so the rate is higher during these periods and lower between. The duration of a burst is very short, < 1 s.

The intermediate bursts have typical durations of \(\sim\) few seconds and are much more rare. The extremely energetic giant flares (GF) are very rare — only three (or four, as suggested, for example, by Mazets et al. (2004)\(^2\)) have been observed. These bursts have a very intensive initial spike with the duration of a fraction of a second and a pulsating tail with a significant energy fluence but with a much lower intensity (for the HF of SGR 1806-20 the energy emitted in the spike was much higher than the energy in the tail). Further, we consider only the initial spikes as they can be confused with the short \(\gamma\)-ray bursts. The rate of GFs is very uncertain due to the lack of detections, usually it is estimated to be about \((1/25 - 1/50)\) yrs\(^{-1}\) per source (Woods & Thompson 2004).

The latest GF was observed on December 27, 2004 (Borkowski et al. 2005). There has been a number of papers analyzing this burst (Hurley et al. 2005; Mazets et al. 2005; Mereghetti et al. 2005).

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\(^1\) Here and below we refer to Woods & Thompson (2004) for the recent summary of all properties of SGRs.

\(^2\) Many authors do not include the burst of SGR 1627-41 on June 18, 1998 as it was slightly dimmer than others and had no pulsating tail. That is why it is often claimed that only three GFs have been detected and we accept this value in the rest of the paper.
The burst energy release is above $10^{46}$ erg (if the distance estimate of 15 kpc is correct, see discussion in (Cameron et al. 2005; McClure-Griffiths & Gaensler 2005)). It is two orders of magnitude higher than the energy release of the other GFs. It has been suggested to be a representative of the forth class of bursts – “supergiant flares” or “hyperflares” (HFs). In principle, this burst could form a continuous distribution together with the other GFs. However, the huge difference in the luminosity is the reason to consider this kind of events separately and use the term “hyper”.

As well as being very interesting SGRs are also very rare, probably due to their short life cycle, $\sim 10^4$ yrs. It is suggested that about 10% of all NSs had been born as magnetars (Kouveliotou et al. 1998) and appeared as SGRs in their youth. It would be very important to detect these sources outside the Local Group. Especially, it is interesting to understand the birth rate of SGRs and the fraction of the NSs that produce these sources.

Here, we would like to discuss the possibility of observing SGRs outside the Local Group (for the previous discussions of extragalactic SGRs see Mazets et al. (1982), Duncan (2001) and the recent e-print by Nakar et al. (2005)). The detection of such objects will give us an opportunity to study the properties of SGRs with larger statistics. In this short note we focus mainly on the regions of active star formation. The connection between SGRs and star formation is obvious. Being very young objects SGRs have to trace the regions of massive star production. The higher the star formation rate (SFR) the larger is the number of SGRs. In addition, recently, several authors suggested that magnetars should be born from the most massive stars that still produce NSs (Figer et al. 2005; Gaensler et al. 2005). Thus, there is a clear relation between the SGR formation rate and the star formation rate of massive stars (and so the supernova rate).

We will discuss three types of sites for the observations of extragalactic GFs and HFs:

- Close-by (<5 Mpc) galaxies with high star formation rate should give the main contribution to the detection of GFs and HFs.
- Few galaxies with extreme values of star formation rate (so-called “supernova factories”) are the best sights to search for rare HFs.
- HFs also can be expected to be detectable from the Virgo cluster of galaxies.

Note, that the NSs originated from massive progenitors are expected to be massive themselves (Woosley, Heger & Weaver 2002). There are many properties, that distinguish massive NSs. Here we want to mention the possibility of solid core formation (Alpar & He 1983) which can lead to an opportunity to support strong glitches.
In the next section, we focus on the first topic, the rest two are discussed in the third and the forth sections. We also discuss the use of the BATSE data as an archive to search for GFs and HFs. So far, this experiment provided the best possibilities for detection of bursts of high-energy radiation due to its half-sky exposure, long observation time and high sensitivity.

2 GIANT FLARES FROM NEARBY GALAXIES

As it is discussed by Heckman (1998), inside the 10 Mpc radius, 25% of star formation is due to just four well-known galaxies: M82 (d= 3.4 Mpc), NGC 253 (2.5 Mpc), NGC 4945 (3.7 Mpc), and M83 (3.7 Mpc). Obviously, inside $\sim 4 - 5$ Mpc (this is the limiting distance for the BATSE detection of a GF, see Fig. 3 below and the discussion in the text) their contribution is even higher. The main idea which we put forward here is the following: in BATSE data, the close-by galaxies with a high present-day star formation rate are the best sites to search for SGRs outside the Local Group.

We scale the SGR activity by the rate of supernova bursts assuming that the number of SGRs is proportional to the supernova rate and the activity of each source is identical. Usually, uncertainties in supernova (SN) rates vary by a factor of 2-3. As a simple estimate, let us use the following values: 0.4, 0.2, 0.3, and 0.1 SN per year for M82, NGC 253, NGC 4945, and M83, correspondently. These values are obtained by scaling the mean SN rate of NGC 253 (0.2 SN per year; Engelbracht et al. (1998); Pietsch et al. (2001)) using the far infra-red luminosity data given in (Bregman, Temi & Rank 2000). Several investigations (see, for example, references in Bregman, Temi & Rank (2000)) showed that the method based on the far infra-red luminosity allows one to estimate the relative SN rate with a high precision. Thus, the main uncertainty is the rate of SN in NGC 253, however this is a well-studied galaxy, and all estimates of the SN rate given in the literature are close to 0.2 SN per year.

In comparison with the Galactic SN rate, these galaxies have significant enhancement (roughly a factor of 12, 6, 9, and 3 correspondently). It total, the SN rate in the four galaxies is $\sim 30$ times higher than the one in the Milky Way. We can expect proportionally higher number of SGRs (and GFs) from them. With the Galactic rate of $\sim 3$ flares in 25 years, for BATSE (4.75 years equivalent of all-sky coverage) we can expect roughly 6-7 GFs from

4 http://cossc.gsfc.nasa.gov/batse/
M82, 3-4 GFs from NGC 253, 5-6 from NGC 4945, and 1-2 GFs from M83 (in total about 15-20 GFs from four galaxies during the BATSE life cycle).

Could BATSE observe GFs from these galaxies? It is not a simple question. Surprisingly, we have no reliable estimate of the peak luminosity of the initial spikes in giant SGR flares. The problem is that they are so strong that all detectors get severely saturated during Galactic giant flares. The situation was slightly better for the event of March 5, 1979 (Mazets et al. 1979; Golenetskii et al. 1979), as it happened at a larger distance (in the LMC). Nevertheless, Venera 11 and Venera 12 detectors were still saturated. Using the raw count rate detected by Konus (see Fig.1, lower curve), one gets the maximal energy flux of $\sim 0.3 \cdot 10^{-3}$ erg cm$^{-2}$ s$^{-1}$. Golenetskii et al. (1979) estimate the peak flux to be $1.5 \cdot 10^{-3}$ erg cm$^{-2}$ s$^{-1}$. This estimate corresponds to the luminosity of $0.8 \cdot 10^{45}$ erg s$^{-1}$. The difference between these two values is probably due to the correction for the dead time.

To estimate the distance from which such event can be observed by BATSE, we use the spectrum measured by Golenetskii et al. (1979) (there exist, however, a different reconstruction of this GF spectrum by Fenimore, Klebesadel & Laros (1996), see discussion below) and different versions of the count rate curve (see Fig. 1). The first version is just the raw count rate and can be considered as a conservative lower limit. It corresponds to the energy release in the initial spike $2 \cdot 10^{43}$ erg. The second version is a narrow top spike reaching the level of count rate $10^6$ cts s$^{-1}$ corresponding to the peak flux $1.5 \cdot 10^{-3}$ erg cm$^{-2}$ s$^{-1}$ and $0.45 \cdot 10^{44}$ erg energy release. The third version corresponds to the same peak intensity but a wider top, and therefore to a larger total energy release $0.6 \cdot 10^{44}$ erg. The reconstruction of the profile is somewhat arbitrary (the third version is the closest to the reconstruction by Golenetskii et al. (1979)) and should be treated simply as an illustration of possible variations.

In each case, the spectrum by Golenetskii et al. (1979) was folded with the BATSE detector response matrix (Pendleton et al. 1999) at a random orientation of the satellite relative to the burst arrival direction. Then, the simulated counts were added to one of the real background fragments sampled from the BATSE continuous archive records with simulated Poisson noise in 64 ms bins. Finally, the BATSE triggering scheme was applied to each synthetic burst. The probabilities of BATSE triggering vs. the distance to the source are given in Fig 2. Curves in this figure (and in the following one) are normalized in such a way that the asymptotic value, which is reached at small distances, represents the sky coverage of detectors.
Figure 1. Assumed time profiles of the initial spike of the 5th March 1979 event. Different versions of the reconstruction are shown. Solid curve: the raw count rate (subject of saturation), dotted curve: the reconstruction up to $1.5 \times 10^{-3}$ erg cm$^{-2}$ s$^{-1}$ as a narrow top spike. Dashed curve: the reconstruction to the same level but as a wider top spike. Curves are smoothed.

In the first case (solid curve, the Konus raw counts), the only large galaxy in the detectable range is M31. No appropriate candidate for the GFs from M31 has been detected by BATSE [Bisnovatyi-Kogan 2001]. This is not surprising as it is not expected that the SGR activity in M31 is higher than in our Galaxy, and BATSE during its lifetime observed only one GF – it is the doubtful event from SGR 1627-41 which is not considered to be real GF by many authors. In the second and the third cases (dotted and dashed lines), GFs from the four near-by galaxies with high SFR mentioned above are detectable, albeit as fairly weak bursts with a poor angular accuracy.

It is useful to check whether there are potential SGR candidates in these four galaxies in the BATSE catalogue. We have to look for short bursts with $T_{90}$ less than 2 seconds at least (the burst from SGR 1627-41 was longer than initial strong spikes from the three other SGRs). In the duration table of the BATSE catalogue the number of GRBs shorter than 2 s is 500. The expected number of chance overlaps of their error boxes with the four galaxies is 9.4 (2.36 per a local object). Actually, we have 12 overlaps of 11 GRBs which is consistent with the expectation for chance coincidence. We added a few overlapping GRBs that are not in the duration table but have approximate estimate of duration within 2 s. All these short GRBs are given in Table 1. For each burst, we give its trigger number, coordinates, error box radius, $T_{50}$ and $T_{90}$, energy release in the source at the distance corresponding to the galaxy with which the error box overlap, and hardness ratios (counts in BATSE channels.
Figure 2. The probability of the BATSE detection of a giant flare similar to the 05 March 1979 as a function of distance. The real BATSE exposure factor, the representative background sample, the detector response matrix and the triggering procedure are taken into account. Curves correspond to different versions of the time profiles shown in Fig.1. For small distances, curves approach the asymptotic value defined by the sky coverage of BATSE.

Can some of these events be the GFs originated in the four galaxies? Their energy releases are comparable to that estimated for the March 5, 1979 event.

If we accept the requirement that the time profiles of GFs should be smooth structureless pulses same as the 05 March 1979 event, then we have to exclude four events (triggers 3895, 6255, 6547, 7385) from the list since they have a substructure. If we require that the duration of GF spikes is between 0.1 and 0.3 as that of the three detected GFs then we have to exclude triggers 2054, 7297, 6447, 7361, 3895. If we suggest that the spectrum, measured by Golenetskii et al. (1979), represents a typical spectrum of a GF, then we have to exclude almost all events.

Indeed, this spectrum, once folded with the BATSE detector response matrix gives the following count ratio in the three energy channels (1:2:3): 1:1.36:0.58. All events are much harder except triggers 7970 and 7591 which are just slightly harder.

To what extent should we rely on the spectrum by Golenetskii et al. (1979)? Fenimore, Klebesadel & Lan (1990) reanalyzed the ISEE-3 data for this event and obtained much harder spectrum which is inconsistent with the Konus data. It should be noted that both reconstructions have their own problems. The Konus data are integrated over the 3.28 s time interval and are
Table 1. GRBs coincident with SF galaxies

| Trigger number | α     | δ     | Error box | $T_{50}$, s | $T_{90}$, s | Energy $\times 10^{44}$ erg | Ratio 2/1 | Ratio 3/1 |
|---------------|-------|-------|-----------|-------------|-------------|-----------------------------|----------|----------|
| M82           | 148.95| 69.68 |           |             |             |                             |          |          |
| 2054          | 164.33| 66.15 | 17.91     | 0.136       | 0.232       | 1.1                         | 3.4      | 5.0      |
| 3118          | 117.57| 80.37 | 23.0      | 0.029       | 0.097       | 0.37                        | 1.7      | 2.1      |
| 6255          | 148.68| 60.79 | 12.71     | 0.143       | 0.239       | 1.1                         | 1.2      | 1.6      |
| 6547          | 155.18| 62.23 | 13.58     | 0.438       | 1.141       | 2.1                         | 2.0      | 3.4      |
| 7297          | 140.07| 76.39 | 9.53      | 0.157       | 0.387       | 1.3                         | 1.1      | 0.9      |
| 7970          | 136.87| 64.49 | 8.48      | 0.075       | 0.218       | 1.4                         | 1.9      | 7.9      |
| M83           | 204.25| -29.87|           |             |             |                             |          |          |
| 1510          | 198.84| -34.35| 7.29      | 0.128       | 0.192       | 0.50                        | 1.3      | 1.3      |
| 2384          | 203.8 | -18.21| 17.81     | 0.256       | 1.024       | 1.2                         | 1.5      | 1.9      |
| 2596          | 211.51| -27.07| 19.74     | 0.960       | 1.856       | 1.6                         | 1.9      | 3.1      |
| 5444          | 199.44| -31.51| 4.94      | 0.128       | 0.192       | 0.50                        | 1.3      | 1.3      |
| 6447          | 191.44| -36.6 | 14.77     | 0.256       | 1.024       | 1.2                         | 1.5      | 1.9      |
| 7361          | 204.17| -28.29| 7.28      | 0.960       | 1.856       | 1.6                         | 1.9      | 3.1      |
| 7385          | 203.02| -27.1 | 3.59      | 0.128       | 0.192       | 0.50                        | 1.3      | 1.3      |
| 8076          | 199.39| -29.98| 7.39      | 0.075       | 0.218       | 1.4                         | 1.9      | 7.9      |
| NGC 253       | 11.9  | -25.3 |           |             |             |                             |          |          |
| 2312          | 14.72 | -33.56| 8.93      | 0.112       | 0.272       | 0.87                        | 1.2      | 12.2     |
| 7591          | 15.75 | -32.66| 8.03      | 0.112       | 0.272       | 0.87                        | 1.2      | 12.2     |
| NGC 4945      | 196.5 | -49.5 |           |             |             |                             |          |          |
| 2800          | 200.29| -47.94| 15.92     | 0.320       | 0.448       | 1.3                         | 1.6      | 2.1      |
| 3895          | 189.39| -47.72| 6.99      | 0.384       | 0.768       | 1.3                         | $\gtrsim$1.4 | $\gtrsim$2.0 |
| 6447          | 191.44| -36.6 | 14.77     | 0.256       | 1.024       | 1.2                         | 1.5      | 1.9      |

contaminated by approximately 1/3 of photons from the softer pulsating tail\(^5\). The ISEE-3 detector observed the flare through the spacecraft, and the reconstruction relies on the difficult simulation of the photon transfer through the instrument with a complicated matter distribution.

We should recognize that we have no solid hypothesis of the GFs spectra: the data are available only for one event and are rather ambiguous. If we still rely on the Konus spectrum as on the one, obtained in a more straightforward way, then we have to accept two events as a conservative upper limit to the observed number of GFs from the four galaxies. In this case, the 90% upper limit on the expected number of observable GFs (i.e. with the energy release $> 0.5 \times 10^{45}$ erg, see Fig. 2 and Table 1) in these galaxies during BATSE exposure is $\sim 5$ (i.e. $\sim 1$ yr\(^{-1}\) per all four galaxies). The rate of such GFs in our Galaxy (not per source!) should be $\sim 30$ times less, or $\sim 1/30$ yr\(^{-1}\). This is somewhat smaller than has been observed.

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\(^5\) See the raw count rate curve at [http://www.ioffe.rssi.ru/LEA/SGR/Catalog/Data/0526/790305.htm](http://www.ioffe.rssi.ru/LEA/SGR/Catalog/Data/0526/790305.htm)
3 HYPERFLARES IN THE 50 MPC VICINITY

The situation with supergiant flares like that of December 27, 2004 is quite different since the BATSE sampling volume for such events is larger by more than 3 orders of magnitude (i.e. accessible distance is larger by a factor of 10). The data indicate that the spectrum of this flare is much harder than that of the March 5, 1979 event: according to Hurley et al. (2005) the spectrum of the initial spike of the December 27, 2004 flare can be described by a blackbody with the temperature of 200 keV. It seems only natural that the events that differ by two orders of magnitude in the energy release have different spectra. Fig 3 shows the probability of detection of $2 \cdot 10^{46}$ erg flare by BATSE for two spectral shapes: as suggested by Hurley et al. (2005) and for the spectrum of the March the 5th event from Golenetskii et al. (1979). The sensitivity is lower in the case of a harder spectrum due to a smaller number of photons in the 50 - 300 keV band at the same energy release.

The largest structure inside the sampling distance $R \sim 50$ Mpc is the Virgo galaxy...
cluster (the cluster center is $\sim 17$ Mpc away, and the approximate coordinates of the center are $\alpha = 187.5^\circ$, $\delta = 12.5^\circ$). It contains about 1300 galaxies including 130 spirals (see Binggeli, Tammann & Sandage (1987) for details). Total star formation rate in the cluster is few hundred times larger than in our Galaxy. BATSE should be able to detect supergiant flares from the Virgo cluster as fairly strong bursts. We selected short GRBs detected by BATSE with $0.05 < T_{50} < 0.7$ s. There are 402 such events. Only two of them are projected onto the Virgo cluster (assuming it as a circle with 10° radius). Their trigger numbers are 2896 (coordinates: $\alpha = 180^\circ$, $\delta = 8.92^\circ$, energetics: $1.8 \cdot 10^{46} \text{ erg at 17 Mpc}$) and 6867 (coordinates: $\alpha = 185.37^\circ$, $\delta = 10.02^\circ$, energetics: $0.3 \cdot 10^{46}$ erg). Three more events have error circles overlapping with Virgo. This result, again, is within the expectation for a chance projection. Again, we have no evidence of any HF detections, this allows us to put a 90% upper limit on the event rate: $\sim 2$ HFs in the Virgo cluster during the BATSE exposure (assuming 2 detected at 3 expected coincidences and 2 expected intrinsic). It implies that on the 27th of December 2004, an exceptionally rare event has been observed.

The rate of such bursts (with energy release in the initial spike above $\sim 5 \cdot 10^{45}$ erg) is below $10^{-3} \times SFR_{500} \text{ yr}^{-1}$ per galaxy, where $SFR_{500}$ is the SFR rate in the Virgo cluster divided by 500 galactic SFRs: $SFR_{500} = (\text{SFR in Virgo})/(\text{SFR in the galaxy} \times 500)$. This constraint coincides with that by Nakar et al. (2005) made with a different method. When this work was completed in its original form, the paper by Palmer et al. (2005) appeared. These authors presented (without a detailed discussion) a similar constraint, still 3 times higher, using the Virgo cluster argument.

There are two other promising candidates for the HF detection within 50 Mpc outside the Virgo cluster. These are Arp 299 (Neff, Ulvestad & Teng 2004) and NGC 3256 (Lipari et al. 2004), two galaxies with extreme star formation rate ("supernova factories"). The total star formation rate in these galaxies is few times lower than that in the Virgo cluster, therefore they are a less probable source of HFs in the BATSE data.

Nevertheless, these galaxies are of great interest since they are well-localized and can lead to measurements with a better angular resolution. A number of candidates for HFs from these galaxies is given by Popov (private communication). It is interesting to note, that the same two galaxies were discussed by Smialkowski, Giller & Michalak (2002); Giller, Michalak & Smialkowski (2003) as possible sources of ultra high energy cosmic rays. Together with the recent sug-

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6 The expected number of chance projections is about 3.

7 See the e-print astro-ph/0502291.
gestion by Eichler (2005) it brings another flavour to the problem of high energy activity of magnetars and its link with star-forming galaxies.

4 DISCUSSION

We do not see any convincing BATSE detections of SGR GFs from the nearby star-forming galaxies. This non-detection allows us to put a constraint on the total galactic rate of GFs and HFs with the energy release in the initial spike $> 0.5 \cdot 10^{44}$ erg. This rate has to be less than $1/25 \text{ yr}^{-1}$ (note that this estimate is based on the assumption of a low hardness of GFs, see Sec. 2). The observations of flares from the sources in our Galaxy indicate that the rate of GFs + HFs is higher, still, we can conclude that most of them have energy release in the initial spike $< 0.5 \cdot 10^{44}$ erg. The only evident exception is the flare detected on the 27th of December of 2004, therefore, this upper limit is not in a conflict with the data.

The absence of detections of hyperflares from the Virgo cluster makes the recent hyperflare of SGR 1806-20 an exceptionally rare event. A possible beaming of the emission does not change the conclusion: in this case we just have to state the same about the observational probability of such event. However, the conclusion is based on the flare energetics calculated for the 1806-20 distance estimate of 15 kpc. If it is less then 5 kpc, then BATSE could not observe hyperflares from the Virgo cluster and the constraint should be relaxed. However, recent analysis (McClure-Griffiths & Gaensler 2005) suggests that the distance is $> 6$ kpc.

In any case, the conclusion by Hurley et al. (2005) that a large fraction of short GRBs detected by BATSE can actually be the initial spikes of extragalactic hyperflares seems too enthusiastic. If the distance estimate 15 kpc is correct, then the Virgo constraint is valid and we can renormalize it to the sampling sphere of the radius of 50 Mpc. The average total star formation rate in this sphere is $\sim$ few thousand $M_\odot$ per year. This estimate can be obtained in several ways. For example, Duncan (2001) uses the following expression to obtain an estimate of a number of galaxies similar to the Milky Way: $N_{\text{Gal}} = 0.0117 h_0^3 R_{\text{Mpc}}^3$. For $R = 50$ Mpc we obtain about 1500 galaxies. So, for 4.5 years of observation we can expect nearly 800 GFs and about 200 HFs assuming 3 GFs and 1 HF observed in the Milky Way in 25 years. Similar estimates can be obtained using estimates of Brinchmann et al. (2004) and Gallego et al. (1995). Brinchmann et al. (2004) provide the following value for SFR density at $z = 0.1$: 0.01915 $M_\odot$/yr/Mpc$^3$. Inside 50 Mpc it gives $\approx 10^4 M_\odot$/yr/Mpc$^3$. SFR for the Milky way is estimated to be few solar masses per year. So, the ratio is about few
thousands. Gallego et al. (1995) estimate SFR in star-forming galaxies for $z \lesssim 0.045$ as $0.013 \, M_{\odot}/yr/Mpc^3$. It gives $\approx 6800 \, M_{\odot}/yr/Mpc^3$ inside 50 Mpc. All three estimates are in good agreement. Comparing these values of SFR with few solar masses per year in our Galaxy one concludes that BATSE could observe $\sim 30 \cdot SFR_{500}$ supergiant flares during its 4.75 years of full-sky exposure, i.e. not more than a few percent of the total number of short GRBs.

In this note, as in the previous literature, we assume the rate and luminosity of GFs to be constant. However, it should be considered as only a zeroth approximation, since all types of NS activity usually decrease with time (for example, rate of glitches, Alpar & Ho (1983)). If one hypothesizes that the rate of GFs decays with time as $\propto t^{-\alpha}$, then two interesting consequences can be discussed. The first one is the following. For $\alpha > 1$ it becomes more probable to discover a younger magnetar (if energies of flares are the same for all ages). In that case one can safely claim that in our Galaxy there are no magnetars younger than the four known. Then it is necessary to note, that for larger $\alpha$, the rate of flares in the magnetar youth becomes so high, that the energy of the magnetic field, $\sim 10^{47} \, B_{15}^2$ erg, is not sufficient to support numerous GFs with luminosities similar to the one of March 5, 1979. This can explain the fact that no good GF candidates were found from star-forming galaxies. In the four near-by star-forming galaxies there should be SGRs $\sim 10$ times younger than the Galactic ones; in galaxies like Arp 299 and NGC 3256 we expect to find magnetars with ages about few tens of years. If they produce frequent bursts, then non-detection should mean that their luminosities are lower than those exhibited by the galactic sources.

As it is noted by Hurley et al. (2005), Swift gives an excellent opportunity to observe extragalactic GFs and HFs of SGRs. We would like to emphasize that the most promising targets for such observation are the Virgo cluster (for HFs) and galaxies M82, M83, NGC 253, and NGC 4945 (for GFs). Of course, due to the large field of view of Swift, several objects can be observed simultaneously. The possibility to detect a very strong HF from a young SGR, as discussed by Hurley et al. (2005), is much higher in the case of galaxies with extreme star formation. Arp 299 and NGC 3256 can be good targets for such observations.

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8 Long pointings of Integral in the direction of the Virgo cluster potentially also can result in detection of GFs or/and HFs. Unfortunately, Integral Galactic plane scans do not cover Virgo or any of the six galaxies discussed in this paper.
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