DEUTSCHES ELEKTRONEN-SYNCHROTRON DESY

DESY 88-113
August 1988

UPPER LIMITS FOR THE DECAY OF τ-LEPTONS INTO η-MESONS

by

ARGUS Collaboration

ISSN 0418-9833

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DESY 88-113
August 1988

ISSN 0418-9833

Upper Limits for the Decay of τ-Leptons into η-Mesons

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[9] Supported by the U.S. National Science Foundation.
[10] Supported by the German Bundesministerium für Forschung und Technologie, under contract number 054KA17P.
[11] Supported by Raziskovalna skupnost Slovenije and the Internationales Büro KfA, Jülich.
[12] Supported by the Swedish Research Council.
[13] Supported by the U.S. Department of Energy, under contract DE-AS09-80ER10690.

Abstract

The production of η-mesons in τ-decays has been studied with the ARGUS detector at the DORIS II storage ring. $\tau^+\tau^-$ events were selected by their characteristic 1-versus-3 charged particle topology. The $\pi^+\pi^-$ invariant mass distribution was used to search for evidence of η production in τ-decays. No signal was observed, leading to upper limits at 95% CL of $\mathrm{Br}(\tau^- \to \eta\pi^-\pi^0\nu_\tau) < 1.1\%$, $\mathrm{Br}(\tau^- \to \eta\eta\pi^-\nu_\tau) < 0.8\%$, $\mathrm{Br}(\tau^- \to \eta\eta\pi^-\pi^0\nu_\tau) < 0.9\%$ and $\mathrm{Br}(\tau^- \to \eta\pi^-\pi^0\pi^0\nu_\tau) < 1.2\%$ [†]. A search for the decay $\tau^- \to \eta\pi^-\nu_\tau$, where the π^0 from the decay $\eta \to \pi^+\pi^-\pi^0$ is also reconstructed, yielded an upper limit at 95% CL of $\mathrm{Br}(\tau^- \to \eta\pi^-\nu_\tau) < 0.9\%$. In addition, the inclusive value $(1.65 \pm 0.3 \pm 0.2)\%$ for $\mathrm{Br}(\tau^- \to \omega X^-\nu_\tau)$ follows from this analysis.

1 Introduction

In the standard model of electroweak interactions the τ-lepton is treated as a sequential lepton. In general its observed properties and decays agree with the predictions following from this assumption [1,2]. However, there remains at least one open experimental question, namely the discrepancy, noted some time ago, between the sum of the observed exclusive charged 1-prong branching ratios and the inclusive topological 1-prong branching ratio [3,4]. The improved precision of recent measurements [5,6] has increased the need to resolve this problem. There have been some measurements [7,8] which suggest that the observed excess of the inclusive branching ratio may be due to channels involving η-mesons. However, this explanation raises problems in the framework of the standard model, since it has been shown [9] that low energy e^+e^- data and the measured five-prong branching ratios of τ-decays lead to an estimate that at most 2% of the missing 7% of the 1-prong inclusive branching ratio can be due to τ-decays involving the η-meson.

2 Data analysis

The measurements reported in this paper were performed with the ARGUS detector at the DORIS II storage ring. The detector is a 4π spectrometer described in detail elsewhere [10]. The event sample used in the analysis was collected at centre-of-mass energies between 9.4 GeV and 10.6 GeV, and corresponds to an integrated luminosity of 197 pb^{-1}. A search

[†] References in this paper to a specific charged state are to be interpreted as also implying the charge conjugate state.

was made for τ-pairs corresponding to the combination of decays

$$e^+e^- \longrightarrow \tau^+\tau^- \longrightarrow \eta X^- \nu_\tau$$
$$\hookrightarrow e^+\nu_e\overline{\nu}_\tau\,,\ \mu^+\nu_\mu\overline{\nu}_\tau\,,\ \pi^+ n\gamma\overline{\nu}_\tau \text{ or } K^+ n\gamma\overline{\nu}_\tau, n \geq 0 \quad (1)$$

where the η-meson decays via

$$\eta \to \pi^+\pi^-\pi^0,\ \pi^+\pi^-\gamma$$

In addition, the decay where the ω-meson decays into $\pi^+\pi^-\pi^0$ was also studied. In both cases, the events of interest have a final state with four charged tracks and at least one photon on the 3-prong side. Moreover the τ-pairs are produced with sufficient momentum that the charged particles in the final state have a characteristic 1-versus-3 topology. The search for these channels was performed in the $\pi^+\pi^-$ invariant-mass distribution, which is confined to the narrow mass interval $0.28\ \mathrm{GeV/c^2} \leq m_{\pi^+\pi^-} \leq 0.41\ \mathrm{GeV/c^2}$ in case of the $\eta \to \pi^+\pi^-\pi^0$ decay, and extends to the mass of the η-meson ($m_\eta = 548.8\ \mathrm{MeV/c^2}$ [11]) in the case of the decay $\eta \to \pi^+\pi^-\gamma$ (fig. 1a). Further contributions from other well known resonances exist (fig. 1b). In addition, a nonresonant component from τ-decay and, possibly, a contribution from background sources, is expected.

A preselection of the data was made first by applying the following cuts:

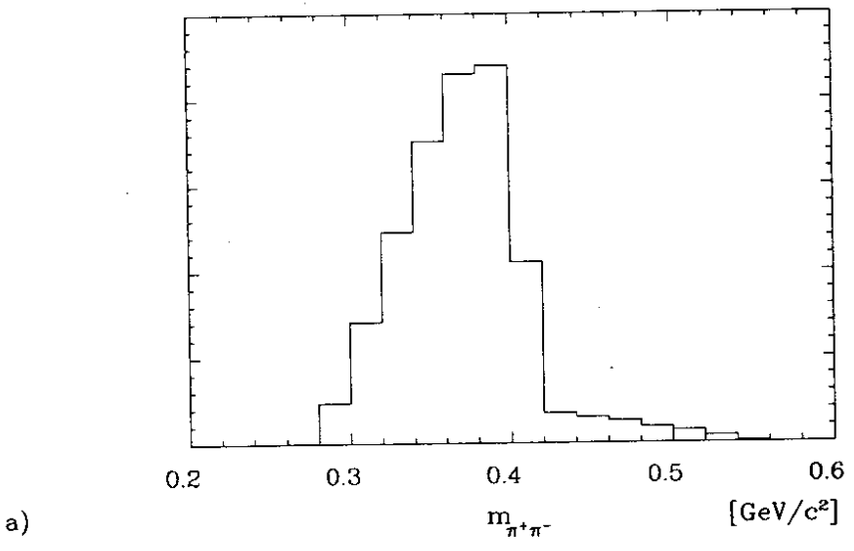
- exactly four charged tracks, all pointing to the main vertex
- total charge zero
- since the τ-pairs are produced back-to-back with large momenta, their decay products typically point into opposite hemispheres. This characteristic 1-versus-3 topology of the charged particles was selected by requiring

  $$\cos(\vec{p}_1, \vec{p}_i) < 0 \quad i = 2,3,4$$

  and

  $$\cos(\vec{p}_1, \sum_{i=2}^{4} \vec{p}_i) < -0.5$$

  where $\vec{p}_1$ denotes the momentum of the single prong and $\vec{p}_i$ the momenta of the particles on the 3-prong side respectively.
- Contributions from converted photons due to radiative QED events were reduced by rejecting events with a secondary vertex consistent with a converted photon. Note that the mass cut for oppositely charged particles or a cut on their opening angle cannot be used in the present study, since a search for low mass pion pairs is made.



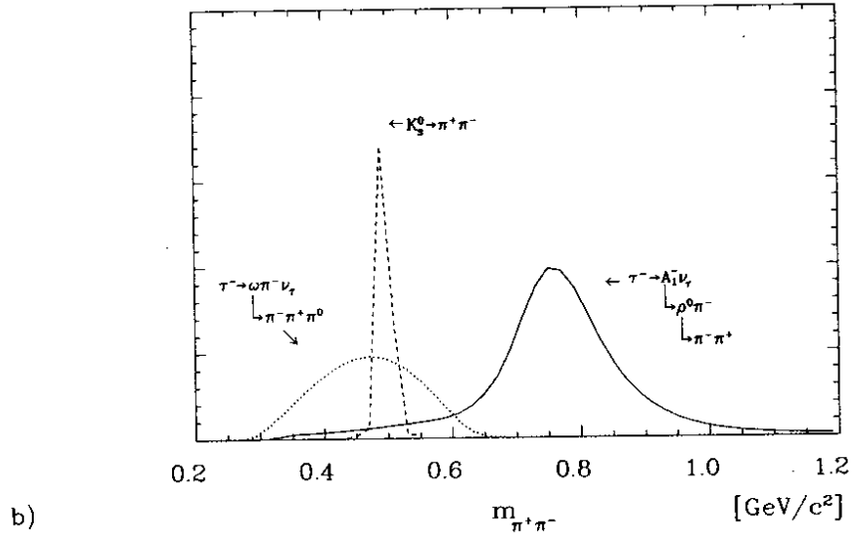


Figure 1: Invariant $\pi^+\pi^-$ mass from resonance decays as used in the analysis:
a) η-decay to $\pi^+\pi^-\pi^0$ and $\pi^+\pi^-\gamma$
b) ρ^0, K^0_s and ω -decay.
The vertical scales are arbitrary.

- A further reduction of background from QED events, $\gamma\gamma$ events and events from hadronic sources results from the cut

$$|\sum_{i=1}^{n} \vec{p}_{Ti}| > 4 \cdot (\sum_{i=1}^{n} |\vec{p}_i|/E_{cms} - 0.65)^2 + 0.1$$

as demonstrated by fig. 2. Note that all neutral and charged particles are used for the sum.

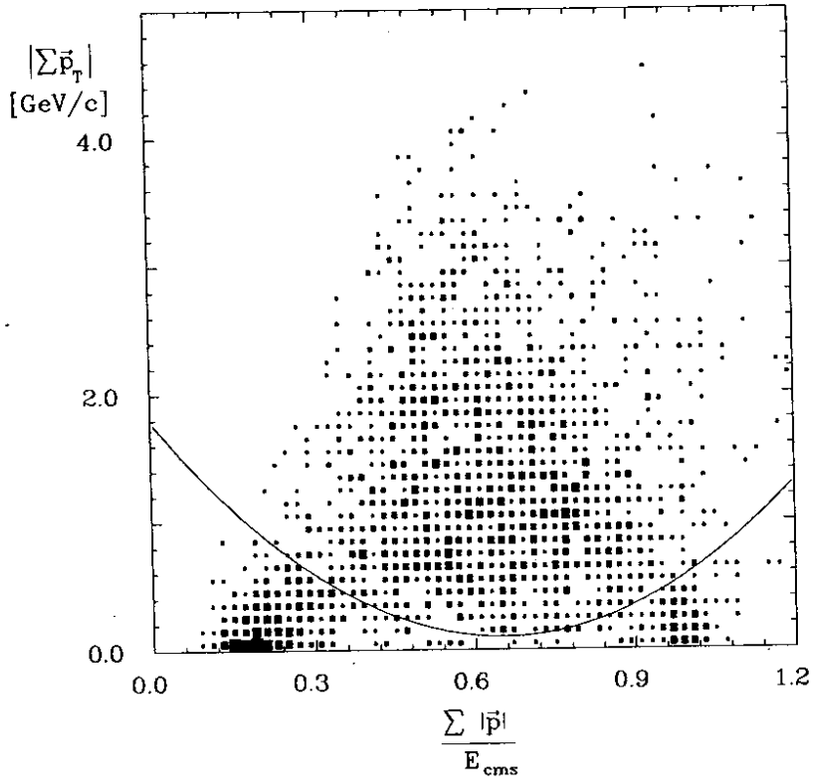


Figure 2: Transverse momentum of the event versus the momentum sum normalized to the centre-of-mass energy. The curve corresponds to the cut described in the text. Events below the curve were rejected.

These cuts reduce the event sample from about $2 \cdot 10^6$ to 32365 events. The sum of the energies deposited in the calorimeter and momenta of the charged particles (fig. 3) indicates that some background from radiative QED events still passes the cuts. Moreover, the con-

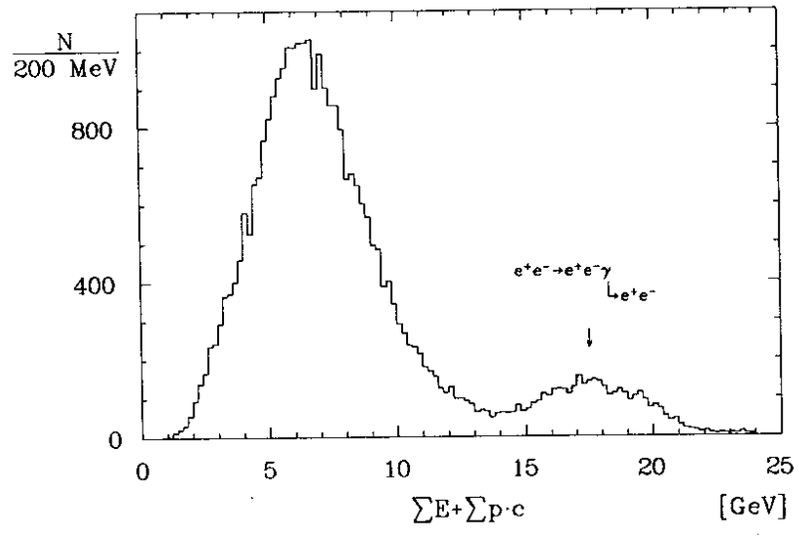


Figure 3: Sum of momenta of all charged particles and their energy deposited in the calorimeter.

tribution of $\gamma\gamma$ events as an additional background source has not been totally eliminated. Therefore, further cuts were applied. In order to eliminate the background due to radiative QED events the following additional requirements were made:

- The momenta of the charged tracks were restricted to $|\vec{p}_i| < 4$ GeV/c
- The energy deposited by the 1-prong in the shower counters, as well as the sum of the energy deposition by the charged particles on the 3-prong side, were restricted to be less than 4 GeV

$$E^1_{shower} < 4 \text{ GeV and } \sum_{i=2}^{4} E^i_{shower} < 4 \text{ GeV}$$

Thie background due to $\gamma\gamma$ events was rejected by a cut on the total visible momentum of the charged particles:

$$\sum_{i=1}^{4} |\vec{p}_i| > 2.7 \text{ GeV/c}$$

A final requirement was to consider only events with ≥ 1 photon with $E_\gamma \geq 50$ MeV on the 3-prong side

$$\cos(\vec{p}_1, \vec{p}_\gamma) < 0$$

These cuts reduce the data sample from 32365 to 16129 events. Of these events, 14388 have an invariant mass of the 3-prong system (using the pion mass for all 3 tracks), $m_{3\pi}$, less than 1.8 GeV/c^2, just above the mass of the τ-lepton ($m_\tau = 1.7842 \pm 0.0032$ GeV/c^2 [11]).

A Monte Carlo study of possible $\gamma\gamma$ background channels ($\pi^+\pi^-\pi^+\pi^-$, $\pi^+\pi^-\pi^+\pi^-\pi^0$ and $\pi^+\pi^-\pi^+\pi^-\pi^0\pi^0$) showed that, after application of the cuts discussed above, the surviving $\gamma\gamma$ background is negligible. From the study of radiative Bhabha events with one converted photon it was shown that background from this source has also been completely eliminated. The only remaining background source is from hadronic events, namely $q\bar{q}$-reactions and Υ-decays into three gluons.

Rather than applying further cuts to reduce the amount of the hadronic background, studies have been made to reliably determine the level and shape of this contribution. The method to find the number of hadronic background events is based on Monte Carlo generation (Lund version 6.2 and 6.3 [12]) of $q\bar{q}$ events including initial-state radiation, and Υ-decays into three gluons, in order to simulate the expected invariant mass distribution of the 3π system on the 3-prong side after all cuts. If the generated $m_{3\pi}$ distribution is normalized to the measured data in the interval 2 GeV/c^2 $< m_{3\pi} <$ 4 GeV/c^2, the experimental and the Monte Carlo distributions agree perfectly for $m_{3\pi} > 1.8$ GeV/c^2 (fig. 4). Assuming that for

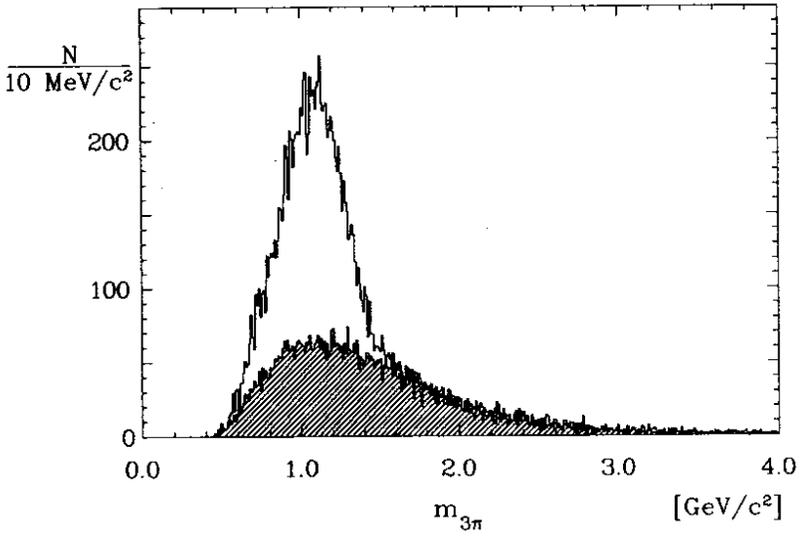


Figure 4: Invariant 3-prong mass. The hatched histogram shows the the simulated hadronic background distribution normalized to the data.

$m_{3\pi} < 1.8$ GeV/c^2 the hadronic background is also described by the Lund model, one finds that $\approx$ 45 % (6029 $\pm$ 2264 out of 14388) of the events in the final sample are due to this background source. The contribution of Υ-decay into 3 gluons to this background has found to be small (727 $\pm$ 68 [13]).

The opposite-sign $\pi^+\pi^-$ and the like-sign $\pi^\pm\pi^\pm$ invariant mass spectra for the hadronic background, as well as for τ-decays, can be determined separately. The method is based on the observation that in a plot of total momentum for all particles in the event

$$|\vec{P}_{tot}| = |\sum_{i=1}^{n} \vec{p}_i|$$

versus the polar angle with respect to the beam axis

$$\cos\theta(\vec{P}_{tot})$$

$q\bar{q}$ events, the main background source, are enhanced at low $|\vec{P}_{tot}|$ and large $|\cos\theta(\vec{P}_{tot})|$ (fig. 5). The variation in the density of the hadronic background can be exploited to divide the data set into two subsamples, one with τ-leptons enriched (for $|\vec{P}_{tot}| \geq 1.5$ GeV/c and $|\cos\theta(\vec{P}_{tot})| \leq 0.9$) and the other with an increased hadronic background component (reversing these cuts). The number of τ and hadronic events in the two subsamples are obtained, as before, by using the Monte Carlo generated spectrum for the $m_{3\pi}$ distribution of the hadronic background, with normalization determined in the mass interval 2 GeV/c^2 $< m_{3\pi} <$ 4 GeV/c^2. The $\pi\pi$ invariant mass spectra for τ decays are then obtained by subtracting the background-enriched sample from the τ-enriched sample, after rescaling the latter to the number of background events in the former. Reversing the procedure, that is rescaling so that the two samples contain the same number of τ events, allows one to extract the $\pi\pi$ spectra for the hadronic background [13].

3 Results

Five channels contribute to the measured $\pi^+\pi^-$ invariant mass spectrum (fig. 6a). $\pi^+\pi^-$ pairs from K^0_s-decays produce a peak whose width can be derived by Monte Carlo simulation [14]. Likewise, the invariant mass distribution of $\pi^+\pi^-$ pairs from ω-decays can be obtained by simulation. The shape of the $\pi^+\pi^-$ distribution from ρ^0-decays was derived from a sample of 3-prong events where no photon is recorded on the 3-prong side. These events are known [15] to be dominated by the decay $A_1^- \to \rho^0\pi^-$ (fig. 6b). The shape of the ρ^0-mass spectrum derived from this data sample has been smoothed and then used in the subsequent analysis. The expected shape of the invariant mass of the $\pi^+\pi^-$ system from $\eta \to \pi^+\pi^-\pi^0$ and $\eta \to \pi^+\pi^-\gamma$

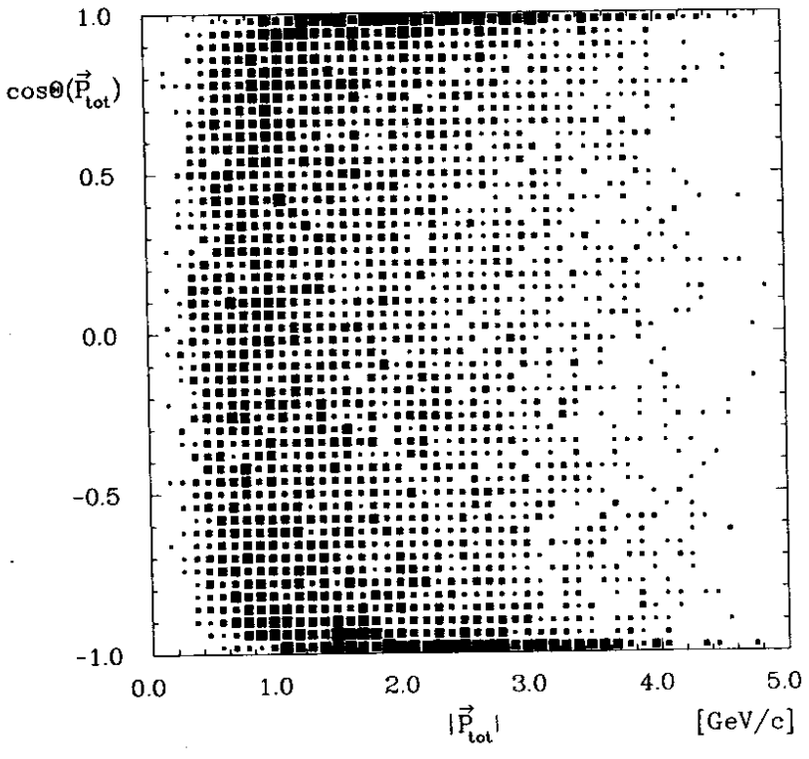


Figure 5: $\cos\theta(\vec{P}_{tot})$ versus $|\vec{P}_{tot}|$ for $q\bar{q}$ Monte Carlo events.

decays was determined by a Monte Carlo simulation, where we have used the matrix element of ref. [16].

Finally a parametrization of the form of the $\pi^+\pi^-$-invariant mass distribution for the hadronic background, and the nonresonant component from the τ-decay channels discussed above, has to be made. Monte Carlo studies show that, for ω, η and ρ^0 production in τ-decays, one of the two possible $\pi^+\pi^-$ combinations will have a distribution identical to that of the $\pi^\pm\pi^\pm$ combination, and hence can be parametrized by the $\pi^\pm\pi^\pm$ invariant mass spectrum.

In addition, the pure τ and hadronic background distributions obtained from the method described in section 2 can be used to check the validity of this approach. In fig. 7 the normalized $\pi^\pm\pi^\pm$ invariant mass distribution of the τ-sample is compared to the corresponding $\pi^+\pi^-$ distribution from the hadronic background data set. The distributions can be seen to have the same shape. Hence, the use of the $\pi^\pm\pi^\pm$(fig. 6a) invariant mass distribution to

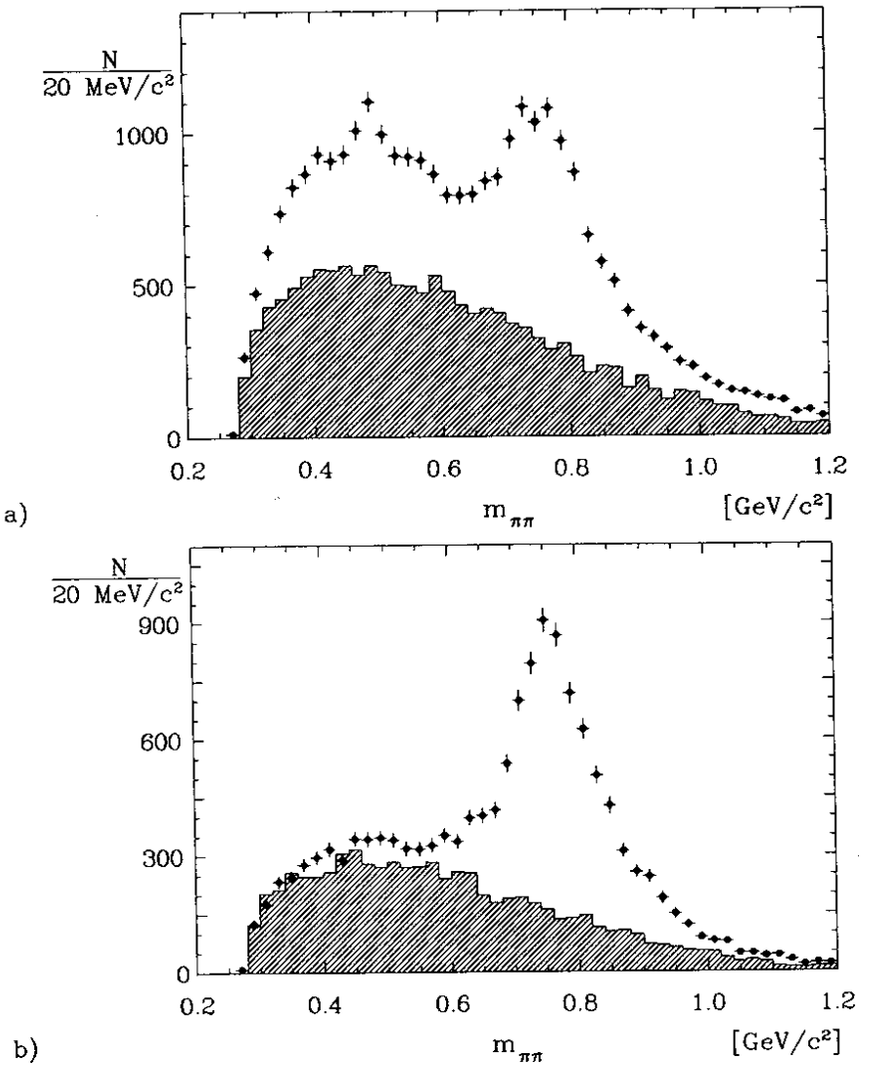


Figure 6: Invariant $\pi^+\pi^-$ mass. The $\pi^\pm\pi^\pm$ invariant mass is shown as hatched histogram.
a) Data with ≥ 1 photon on the 3-prong side
b) Data with no photon on the 3-prong side

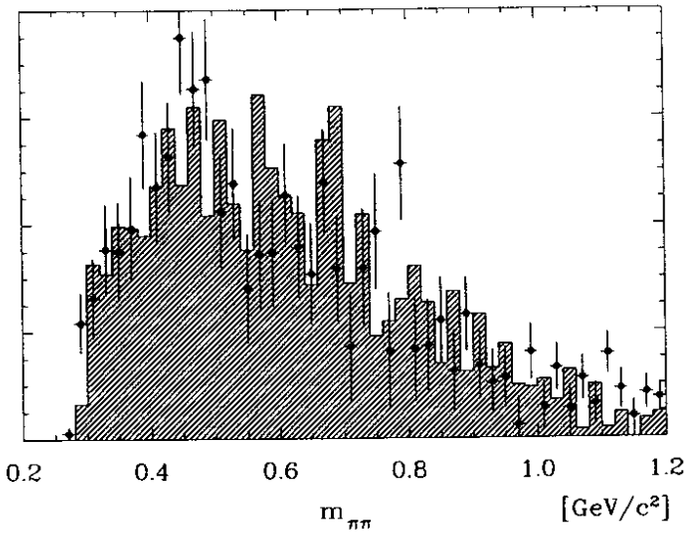


Figure 7: Normalized invariant $\pi^+\pi^-$ mass distribution for the hadronic background sample. The hatched histogram shows the $\pi^\pm\pi^\pm$ invariant mass distribution for the τ-sample. The vertical scale is arbitrary.

describe the $\pi^+\pi^-$ nonresonant background from τ-decays, as well as the contribution from the hadronic background, is justified. Furthermore, the $\pi^\pm\pi^\pm$ invariant mass distributions of both samples coincide in the mass region of interest for this analysis.

Fitting these various components to the observed $\pi^+\pi^-$ invariant mass spectrum resulting from the cuts discussed in section 2, one obtains the distribution shown in fig. 8. No peak in the η-signal region is observed. However, an enhancement in the mass region populated by ω-decays is visible. In addition, peaks due to K^0_S- and ρ^0-decays can be seen. The results of the fit are collected in table 1.

N_η	N_ω	N_{ρ^0}	$N_{K^0_S}$	$N_{\pi^\pm\pi^\pm}$
0	1513 ± 237	6310 ± 189	218 ± 51	20630 ± 393

Table 1: Result of the fit to the $\pi^+\pi^-$ invariant mass spectrum

The $\pi^+\pi^-$ background, fitted with the like-sign $\pi^\pm\pi^\pm$ invariant mass spectrum, is 20630 ± 393 events. If one nonresonant combination per event is subtracted using the $\pi^\pm\pi^\pm$

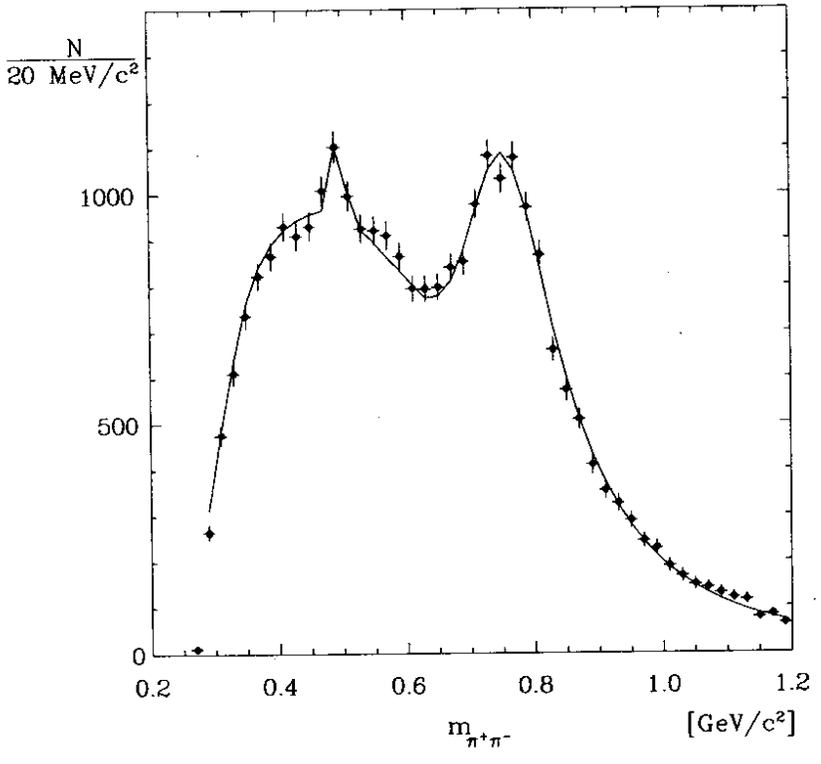


Figure 8: Invariant $\pi^+\pi^-$ mass. The curve shows the results of the fit described in the text.

contribution in the event, one finds 6242 ± 393 events of nonresonant background. This number is in excellent agreement with the hadronic background estimate of 6029 ± 264 events, derived from the 3π-invariant mass spectrum in section 2.

An upper limit on the branching ratio for inclusive τ-decays into η-mesons has been determined by a maximum likelihood method. The likelihood function for the branching ratio considers the likelihood distribution for the number of η-mesons in the observed $\pi^+\pi^-$ invariant mass spectrum (obtained by the fitting procedure), the efficiency for detection of the $\pi^+\pi^-$ system, as well as the uncertainty of the luminosity and the branching ratios for the tagging channels. Further details are given in ref. [13]. In order to minimize systematic errors the fit interval was limited to the mass region $0.28\ \mathrm{GeV/c^2} \leq m_{\pi^+\pi^-} \leq 0.6\ \mathrm{GeV/c^2}$, where contributions from the ρ^0 resonance, which mainly populates the spectrum at higher $\pi^+\pi^-$ masses (fig. 1), are very small. Due to slightly differing detection efficiencies for the

Decay channel	this work	HRS[18]	CB[19]	CLEO[17]
	95% CL	90% CL	95% CL	95% CL
$\tau^- \to \eta\pi^-\pi^0\nu_\tau$	< 1.1 %	-	< 0.9 %	< 2.1 %
$\tau^- \to \eta\pi^-\pi^0\pi^0\nu_\tau$	< 1.2 %	< 0.3 % [a]	< 3.1 %	-
$\tau^- \to \eta\eta\pi^-\nu_\tau$	< 0.83 %	< 0.5 % [b]	< 2.5 %	< 1.5 % [b]
$\tau^- \to \eta\eta\pi^-\pi^0\nu_\tau$	< 0.9 %	< 0.5 % [b]	-	< 1.5 % [b]
$\tau^- \to \eta X^-\nu_\tau$	< 1.3 %	< 2.1 %	-	< 2.1 %

[a] Limit is related through isospin to the limit on the decay $\tau^- \to \eta\pi^-\pi^-\pi^+\nu_\tau$ obtained from the τ-decay to five charged particles.
[b] Limit corresponds to the limit on inclusive production of two η's in τ-decays.

Table 2: Upper limits for different τ-decays

various decay channels, the limits on the branching ratios depend on the specific topology of the mode considered. Each decay channel was assumed to saturate the possible η-production. The results are collected in table 2, which also includes measurements recently published by other groups. The data are in good agreement and are consistent with recent theoretical estimates that τ-decays into η-mesons contribute less than 2% to the inclusive 1-prong decay mode.

In addition, we can convert the number of observed ω-mesons (table 1) into an inclusive branching ratio for the decay $\tau^- \to \omega X^-\nu_\tau$. Neglecting possible contributions due to hadronic background we obtain a value of $\mathrm{Br}(\tau^- \to \omega X^-\nu_\tau) = 1.65 \pm 0.3 \pm 0.2\%$. This is in good agreement with the exclusive branching ratio $\mathrm{Br}(\tau^- \to \omega\pi^-\nu_\tau) = (1.5 \pm 0.3 \pm 0.3)\%$ published by the ARGUS collaboration [20], and with the value $(1.6 \pm 0.27 \pm 0.41)\%$ measured by the CLEO collaboration [17]. Furthermore we have used our final data sample to redo our search for the decay $\tau^- \to \eta\pi^-\nu_\tau$ [21], with the η decaying to $\pi^+\pi^-\pi^0$, using reconstructed π^0's as described in ref. [13]. The new limit is 0.9% at the 95% confidence level.

4 Summary

The results of this analysis show that τ-decays into η-mesons do not provide an explanation for the missing 1-prong problem observed in τ-decays. Instead, the results are in rather good agreement with a recent theoretical analysis [9], which concludes that decays involving the η-meson can account for a maximum 2% of the missing 7% from the 1-prong branching ratio.

Acknowledgements

It is a pleasure to thank U.Djuanda, E.Konrad, E.Michel and W.Reinsch for their competent technical help in running the experiment and processing the data. We thank Dr.H.Nesemann, B.Sarau and the DORIS group for the excellent operation of the storage ring. The visiting groups wish to thank the DESY directorate for the support and kind hospitality extended to them.

References

[1] K.Gan and M.L.Perl, Int. Journal Mod. Phys. **A3** (1988) 531

[2] B.C.Barish and R.Stroynowski, Phys. Rep. **157** (1988) 1

[3] F.J.Gilman and S.H.Rhie, Phys. Rev. **D31** (1985) 1066

[4] T.N.Truong, Phys. Rev. **D30** (1985) 1509

[5] P.R.Burchat et al. (MARK II), Phys. Rev. **D35** (1987) 27

[6] H.Aihara et al. (TPC), Phys. Rev. Lett. **57** (1986) 1836

[7] M.Derrick et al. (HRS), Phys. Lett. **189B** (1987) 260

[8] P.R.Burchat, Proc. XXIII Int. Conf. High Energy Physics Berkeley 1986, p 756

[9] F.J.Gilman, Phys. Rev. **D35** (1987) 3541

[10] H.Albrecht et al. (ARGUS), DESY Report **87-080**

[11] Particle Data Group, Phys.Lett. **170B** (1986) 1

[12] B.Andersson et al., Phys. Rep. **97** (1983) 31

[13] B.Spaan, PhD thesis, Dortmund 1988

[14] H.Gennow, "SIMARG: A Program to simulate the ARGUS Detector", DESY internal report, DESY **F15-85-02** (1985)

[15] H.Albrecht et al. (ARGUS), Z. Phys. **C33** (1986) 7

[16] J.G.Layter et al., Phys. Rev. **D7** (1973) 2565

[17] P.Baringer et al. (CLEO), Phys. Rev. Lett. **59** (1987) 1993

[18] S.Abachi et al. (HRS), Phys.Lett. **197B** (1987) 291

[19] T.Skwarnicki, DESY Report **87-166** and
T.Skwarnicki, Proc. Int. Europhysics Conf. High Energy Physics Uppsala 1987, p 334
All results are preliminary

[20] H.Albrecht et al. (ARGUS), Phys. Lett. **185B** (1987) 223

[21] H.Albrecht et al. (ARGUS), Phys. Lett. **195B** (1987) 307